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VOLUME XXII.



EDITED BY THE  
Rev. C. J. S. Bethune, M. A., D. C. I.,  
PORT HOPE, ONTARIO.

ASSISTED BY  
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REV. C. J. S. BETHUNE.

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## EXCHANGE.

*Subscribers are invited to make liberal use of this column. Notices over three lines are liable to be shortened if necessary. All insertions free to subscribers.*

**ORTHOPTERA WANTED.**—I am especially interested in the study of the Orthoptera, and wish to obtain, either by exchange or purchase, perfect specimens of these insects from all parts. North American and West Indian material preferred. Persons having specimens for sale or exchange will please correspond with me. LAWRENCE BRUNER, Nebraska University, Lincoln, Neb.

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To exchange for perfect specimens of Lepidoptera not in my collection, examples of *Melitaea McGlashani* and *Coenonympha ochracea* from Nevada. S. W. DENTON, Wellesley, Mass.

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Cocoons of hybrids female *S. Ceanothi* male *Cecropia*, also *S. Gloveri* and male *Cecropia*. Lists of other specimens exchanged. For perfect specimens liberal exchanges will be given. No postal cards replied to. MISS EMILY L. MORTON, Newburgh, N. Y. (New Windsor delivery).

**CANADIAN HYMENOPTERA WANTED.**—Named or unnamed, for examination or in exchange. Correspondence desired with collectors in the Eastern and Western Provinces. W. HAGUE HARRINGTON, Post Office Department, Ottawa.

**SPIDERS.**—I wish to obtain American Spiders, and will exchange or name and return duplicate species. NATHAN BANKS, 40 Henstis-St., Ithaca, N. Y.

# The Canadian Entomologist.

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No. 2.

## DESCRIPTION OF A NEW SPECIES OF MELITÆA FROM SOUTHERN CALIFORNIA.

BY W. H. EDWARDS, COALBURGH, W. VA.

### MELITÆA AUGUSTA.

Male.—Expands from 1.6 to 1.75 inch ; belongs to *Chalcedon* group, but is as conspicuously red as the species *Chalcedon* is black ; upper side black, the surface nearly covered with light red and pale yellow spots, disposed as in the group ; the basal areas dusted with yellow scales, which, on primaries, extend along both margins ; costa of same wing edged red ; both hind margins bordered by small red spots, varying in shape, sometimes narrow and as of a broken stripe, sometimes more or less rounded or ovate ; the spots of second row are small, lunular, largest on secondaries, edged with red, the interior being yellow, or they are nearly all red with a small yellow patch in middle ; sometimes this yellow is thinly washed red ; the third row on primaries is either wholly yellow, or yellow with red edges, particularly on the outer side ; on secondaries wholly red, and often very deep, so as to make a conspicuous broad band ; the fourth row on primaries is red, sometimes with the spots next the two margins either yellow or in part yellow ; around the end of cell yellow spots four or five in number ; in the cell spots of red and yellow alternately, four in all, the yellow one at base more or less stained red ; two yellow spots below cell with black ground between, and nearer base a small duplex red one ; the fourth row on secondaries is yellow, either of small spots or pretty large ones, and the three or four from costal margin are red on their outer sides ; a red stripe outside the cell from the end to costal margin ; two small yellow spots inside cell, with a red one between them and a yellow spot below ; fringes yellow, black at the tips of the nervules. Some examples have scarcely any yellow, the yellow having been replaced by red, or tinted red.

Under side of primaries red, the yellow spots repeated, enlarged, and

of clear color ; outside end of cell a large suboval red spot heavily edged black, and the cell is crossed by two wavy black lines.

Secondaries have the margins red, in a continuous band ; the second row yellow, on black ground, lunate ; the third row red, rounded on inner side and edged narrowly with yellow on all sides but the exterior ; the fourth row yellow, cut unequally from one margin to the other by a black line ; thence to base red ; a triangular yellow spot at end of cell, and in a straight row from costal margin three yellow spots, one on margin and partly in costal interspace, one at top of cell, the third in lower median interspace. Sometimes the fourth row is expanded towards base along inner margin, giving the appearance of a fourth spot to the basal row ; the shoulder and edge of costa yellow.

Body above black ; red hairs on collar ; thorax beneath yellow ; abdomen red at sides, yellow along venter, red at end ; legs red ; palpi red ; antennæ pale red-brown, annulated whitish above, red below, club black on upper side, the tip ferruginous, elsewhere red-brown.

Female.—Expands from 1.7 to 2.2 inches.

Like the male in general, but the spots larger in proportion ; on the underside, the spots of second row on each wing are large, lanceolate, the outer side deeply incised. In occasional examples the outer part of upper side of secondaries is covered by a broad red band in place of the spots of second and third rows, and this area is separated from the narrow marginal band by a black line.

In an aberration there is no trace of yellow on upper side, and on the under side of secondaries the yellow bands from margin to cell are replaced by wood-brown, while the yellow basal spots are obscured.

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I name this species *Augusta*, in memory of the late Mrs. W. G. Wright. Mr. Wright has taken it in vicinity of San Bernardino abundantly, and writes of it thus : "*M. Augusta* is found on top of the mountains, elevation 5,000 feet, and is not found at all till you reach the top. They do not descend the mountain sides, nor are they found in the canyons. On the summit oak and pine trees are scattered, and the ground is covered with grasses and flowering plants. The butterfly seems all the time on flowers, and is a great feeder. I have never seen a

pair in copula, nor a female ovipositing, and I know nothing of the early stages. Every year I find *Augusta* at the same place, in the month of June."

It seems to me probable that *Augusta* will be found in Utah and Arizona, perhaps also in Nevada.

### TENTHREDINIDÆ COLLECTED AT OTTAWA, 1889.

BY W. HAGUE HARRINGTON, OTTAWA.

The past season was not a favorable one for the collection of Hymenoptera. The early spring was very fine and warm, but was followed by prolonged spells of cool and rainy weather, which not only made collecting difficult, but appeared to destroy many of the insects. This will be seen by the following list, in which a large proportion of the species are represented by single specimens. It contains about eighty species, or nearly two-thirds of those that have so far been taken in this locality.

Few of the species were at all common, the most abundant and destructive being *N. Erichsonii* Hartig., which we now find wherever there are larches, and by whose larvæ these trees are defoliated and injured. *N. Ribesii* Scop. (*ventricosus* Hartig.), the gooseberry saw-fly, and *H. maculatus* Norton, the strawberry saw-fly, were also numerous. On the other hand several of the species, especially of Macrophyta and Tenthredo, which are usually common in midsummer, were not observed, and there was a noticeable scarcity of larvæ.

*Cimbex americana* Leach, var. *decemmaculata* Leach, female, June 16.  
var. *La Portei* St. Farg., male, May 11.

*Trichiosoma triangulum* Kirby, male, May 12.

*Abia Kennicotti* Norton, female, May 11.

*Hylotoma clavicornis* Fabr., female, June 13.

*McLeayi* Leach, female, May 10.

*Priophorus æqualis* Norton, female, July 14.

*Pristophora identidem* Norton, male, May 27 ; male, June 16.

*tibialis* Norton, female, May 12 ; female, June 26.

*Euura orbitalis* Norton, three females, May 24.

*Nematus aureopectus* Norton, female, May 9 ; two females, May 10 ; female, May 18 ; female, May 27.

- bivittatus* Norton? female, May 11.  
*corniger* Norton, male, May 17; male, May 24; male and female, May 27; female, June 2; male, June 16; male, Aug. 8.  
*Erichsonii* Hartig., female, abundant from May 19; male, June 15.  
*latifasciatus* Cresson, female, June 7.  
*malacus* Norton, female, May 18.  
*mendicus* Walsh, one male and two females, May 9; female, May 17; female, June 26.  
*pleuricus* Norton? female, May 9.  
*Ribesii* Scop., female and male, common, May, June.  
Several species not yet examined, May, June.  
*Emphytus apertus* Norton, female and male, May 17; female, May 18; female, May 27; female, Aug. 8.  
*hullensis* Prov., female, June 23.  
*mellipes* Norton, male, May 11; female, May 24.  
*Harpiphorus maculatus* Norton, male and female abundant, May 9 to June 26.  
*Dolerus albifrons* Norton, seven males and two females May 24.  
*aprilus* Norton, male and female, May and June, common.  
*arvensis* Say, female, April 19, May and June, common.  
*bicolor* Beauv., female, May 27.  
*collaris* Say, female, May 10; female, May 19; female, June 2.  
*unicolor* Beauv., male, May 12.  
*Monophadnus bardus* Say, female June 13.  
*medius* Norton, two females, May 11; female, May 18; female, May 24; two females, June 13.  
*rubi* Harris, female, May 12; female, May 27.  
*Phymatocera canadensis* Harrington, female, May 10; female, May 11; female, May 17.  
*fumipennis* Norton, four males and three females, May 17; female and male, May 18; female, May 20; two males, June 22.  
*Hoplocampa halcyon* Norton, female May 11; female, May 17.  
*Monostegia ignota* Norton, two males and one female, May 27.  
*rosæ* Harris, female, May 19; female, May 22; female, May 24.  
*Selandria flavipes* Norton, two males, May 24; male and female, June 2; female, June 8; male, June 13; two females, August 8.  
*Allantus basilaris* Say, female, June 28; male, July 28.

- Macrophya externa* Say, female, June 26.  
    *flavicoxa* Norton, female, June 13 ; female, June 23 ; two females, June 26 ; two females, June 28 ; female, July 1.  
    *varia* Norton, female, June 20.  
    sp. female, June 26.
- Pachyprotasis delta* Prov., male, June 16 ; female, June 20 ; one male and two females, June 23 ; two females, June 30.  
    *omega* Norton, male, June 28 ; male, July 28.
- Taxonus albidopictus* Norton, female, July 14.  
    *amicus* Norton, male, June 16 ; male and female, June 26.  
    *rufipes* Harrington, male, May 18.  
    *unicinctus* Norton, female, May 27.
- Strongylogaster annulosus* Norton, female, May 24.  
    *apicalis* Say, female, June 13 ; female, June 28 ; male, July 11 ; female, July 28.  
    *longulus* Norton, male, May 24.  
    *luctuosus* Prov., female, May 22.  
    *robustus* Prov., ? female, June 13 ; two females, June 28 ; male, July 1.  
    *soriculatus* Prov., female, May 24.  
    *tacitus* Say, male, May 24 ; female, June 8 ; male, August 8.
- Tenthredo eximia* Norton, male, May 24 ; female, June 28.  
    *grandis* Norton, female, June 15.  
    *mellina* Norton, female, July 7.  
    *ruficolor* Norton, female, May 24 ; female, July 1.  
    *rufipes* Say, female, June 2 ; female, June 23 ; two females, June 26.  
    *rufopectus* Norton, male, June 14 ; male, June 16 ; female, June 26 ; male, July 1.  
    *verticalis* Say, female, June 13 ; female, July 1 ; female, July 14.
- Tenthredopsis atrovioleacea* Norton, female, June 16 ; female, June 30.
- Lophyrus Lecontei* Fitch, two females, (bred) May.
- Monoctenus fulvus* Norton, one male and two females, May 13.
- Lyda canadensis* Norton, female, June 26.  
    *luteicornis* Norton, female, June 2.  
    *luteomaculata* Cresson, female, May 24.  
    *perplexa* Cresson, male, May 11 ; male, May 17.  
    *quebecensis* Prov., female, June 30.

THE NOCTUIDÆ OF EUROPE AND NORTH AMERICA  
COMPARED.

(Fifth Paper.)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Tribe *Orthosiini*.

The vestiture is woolly, and in this lies a distinguishing character from the *Agrotini* and *Hadenini*, which some genera much resemble, while the body is hardly tufted; the rather broad thorax has sometimes a median ridge. The colours of the moths are often shades of brown, red and yellow, like the autumn foliage, in which many of the hibernating species hide. The eyes of the first genera are hairy; in several the tibiæ are spinose, the reverse being usually the case. Whether our, mostly western, species allied to *Perigrapha cincta* are strictly congeneric, I have not been able to decide. *Acerra normalis* has simple antennæ in the male; the ornamentation in most cases suggests the relationship. There are two European species of *Perigrapha* against seven related North American species. The genus *Taniocampa* has twenty-two described American species and only eleven European; among these is one, *alia*, identical. I have not a particle of doubt that for this genus the term *Graphiphora* Hüb., must be retained. My efforts to place the generic nomenclature upon a final basis, by fixing the types in 1874, has met with thoughtless opposition and incorrect criticism. The question of whether Hübner, or others, held our modern (supposed by empirics infallible) ideas upon genera, is quite beside the question of the oldest and therefore proper name for a genus. I have exposed this sort of reckless criticism in the second part of my Check List, 1875, 1876. Only my desire to avoid contention and to enable a comparison of our fauna by the use of the same terms, has induced me to cede the present instance, because the name *Graphiphora* taken from Hübner (to whom we owe almost *all* the leading generic names in the Noctuidæ), had been mis-applied. I think, now, I may have been wrong in this, and that *Graphiphora* should be used, as I originally proposed, with the type *Gothica*, and *Taniocampa* rejected. Only in this way shall we obtain a stable nomenclature, and the European catalogues must conform, if nearer conclusions are to be arrived at, and lists are to be useful beyond a mere stringing of the different species.

The North American hairy-eyed genera allied to *Tæniocampa* are, further, *Crocigrapha*, with a tuft behind the collar; *Orthodes*, *Himella* and *Morrisonia* (the species of which latter curiously resemble *Actinotia*, but seem to hibernate, being found early in the year on fallows); while I have described American species belonging to the naked-eyed European genera *Parastichtis* and *Anchocelis*. Naked-eyed genera, with armed tibiae, are *Pachnobia* and *Metalepsis*, occurring in both faunæ, and *Pseudorthosia*, *Choephora*, *Pseudoglaea*, which seem to be American only. *Trichorthosia*, which has hairy eyes, seems to be more allied to *Xanthia*, or *Orthosia*, in the shape of the wings; but, if we do not divide this tribe, as is perhaps unnecessary, it may be ranged with the other hairy-eyed genera, together with the somewhat aberrant *Trichocosmia*. The principal genus is, perhaps, *Orthosia*, of which fourteen European and seventeen American species are described, mostly of a European habitus, and one representative, *ferrugineoides*. While I have referred one identical species (*togata*) to *Xanthia*, which, as distinct from *Orthosia*, contains seven European species, the singular genus *Jodia* Hüb. (= *Hoporina* Boisd.), has an American representative of *croceago* in *J. rufago* Hübn. *Eucirroedia* is a modification of the European genus *Cirroedia*; while the peculiar genus *Scoliopteryx* with its one species, *libatrix*, is common to Europe and America, from Hudson's Bay to Virginia, and is probably a survival of the former circumpolar fauna. *Glaea* Hübn. (= *Orrhodia* Hübn., *Cerastis* Tr.) has twelve European and only four American species, but the nearly related American genus *Epiglaea*, which differs from *Glaea*, much as *Richia* differs from *Agrotis*, by the presence, namely, of a median thoracic ridge, has five, and *Homoglaea* two described species. Our most beautiful species is *H. carnosa*, in which the egg is also pink in colour. *E. venustula* is said to be the same as *E. sericea*; if the description of the latter is compared, it will be seen to contradict that of *E. venustula* in important points, which remain incomprehensible if the two are really the same. The genera *Ipimorpha* and *Calymnia* have representative, the genus *Cosmia*, an identical species, *paleacea*. While there are a few peculiar genera in both faunæ, such as *Dicycla* in Europe, and *Zotheca* in America, the affinities of the two faunæ in this tribe are strongly marked. The peculiar genus *Scopelosoma* has in Europe one, in America nine species. Of these it is difficult to say which is nearest to the European *satellitæ*; the identification of Guenée's *sidus*

is hence almost impossible; his type also cannot be found. In my opinion he may have had a form of *Walkeri* before him; but whether this, or *vinulenta*, or even *tri-stigmata*, or *Morrisoni*, cannot, with certainty, be made out from his comparative description. As I have separated all the American forms under distinct names, and Mr. Thaxter has shown the distinctness of most of them by breeding, these names should be retained until further evidence be forthcoming as to the single species indicated by Guenée. A different course would be the result of mere opinion and, without scientific value, only make confusion.

#### Tribe *Calocampini*.

The vestiture resembles that of the preceding tribe, but the wings are narrower, the legs proportionately shorter, unarmed. The palpi are short; male antennæ thickly ciliate. The primaries are blunt, not widening outwardly as much as usual, with gray or brown, streaky, stone-like markings, hence the name *Lithophane*, used for the principal genus by Hübner. This genus is incorrectly called *Xylina*; Hübner's genus of this name having for type a species of *Hadena*. It seems to have been customary for earlier authors to take names out of Hübner's writings and apply them arbitrarily, with or without diagnosis. The injustice and absurdity of this proceeding must be evident to all thinking persons. Only an empiric, full of his own importance and wishing to elevate himself by contrast, can commit the blunder. If Hübner has not given neurational characters, it is because neurational characters were not then known; at least he has not given us incorrect descriptions of the venation, which is in his favor as compared with certain quite modern writers. *Lithophane* has eight European and about twenty-five American species; again a large preponderance. Of these, *Thaxteri* represents the European *lambda*; but no variety of the latter corresponds with our American form, which must be regarded as a distinct representative species accordingly. The European *ingrica* seems to be represented also by *pexata* and its variety *Washingtoniana*, although in the latter instance nearer comparisons are necessary, which I have not been able to make. *Lithomia* Hüb., which differs by the character of the palpal vestiture and the elevated collar, has apparently a representative species in *germana*; but I strongly suspect that this is really identical with the European *solidaginis*. *Calocampa* has

two European and apparently four American species, one of which is unknown to me; of the other three, *nupera* is said to represent the European *vetusta*, although perhaps identical with it; *cineritia* has the widest range, while both this and *curvimacula* are quite different from either of the European forms. The representation of this tribe in Europe is covered by the American forms.

#### Tribe *Cuculliini*.

The elongate wings are sharply pointed, the collar hood-shaped; the abdomen is tufted terminally and extends beyond the proportionately small secondaries. The European species (43) greatly outnumber the described American forms (11). There are a large number of, closely related species in the European fauna, many of comparatively recent detection. Perhaps more remain to be described in North America, though it is probable that both this and the next tribe will show an excess of European forms. The specific groups seem to be represented in America. I do not know, however, *luna*, which appears to be allied to the European silvery forms. In addition we have a Californian species, *matricariæ* Behr. (= *serraticornis* Lintr.), which has pectinated ♂ antennæ; I have doubted its being a true *cucullia*.

#### Tribe *Cleophanini*.

I have referred to *Cleophana*, two American species with hood-shaped collar and the facies of *Cucullia*, but with a claw to the front tibiæ. The other European genera, *Epimecia*, *Calopharia*, I have not recognized. *Nyctophæata* I believe to be a Heliothid form:

#### Tribe *Euteliini*.

In this tribe of smaller moths, the wings are more or less extended in repose, in the American genus *Marasmalus* folded like a fan. The small secondaries ally them to *Cucullia*. The antennæ have a basal tuft; the collar cut out behind, not hood shaped; the abdomen more or less tufted; the eyes naked. The American *Ripogenus pulcherrimus*, a rare moth, seems to be related to the European *Eutelia adalatrix*.

Tribe *Ingurini*.

The male antennæ are simple at tip. An American form coming to our fauna probably from the south. The form resembles the preceding tribe, but the wings are entire. The species of the single genus *Ingura* are small moths, resembling the species of *Abrostola* in ornamentation, except, perhaps, *oculatrix*, which is a pretty, singularly marked moth.

Tribe *Anomiini*.

Thinly or closely scaled untufted forms, with rather broad and pointed wings and slimy vestiture, the larvæ half loopers. *Anomis* has uneven margins to the primaries. *Aletia* (the "cotton worm") has them even, somewhat sickle-shaped. *Pteratholix* and *Chytoryza* have peculiar clear spots and structure of the fore-wings. The tribe is American, and comes to our fauna from the south.

Tribe *Litoprosopini*.

Larger species with *Plusia*-like palpi, untufted, with brown wings, having curious ocellate markings and metallic points on secondaries. *Hatney* from Cuba, *confligens* from the west coast, *futilis* from Florida, all belonging to *Litoprosopus*, and are tropical American forms intruding into our territory in the south.

Tribe *Calpini*.

The fore-wings are wide, with pointed apices, full external margin, a tooth on inner margin. Eyes naked, lashed. Palpi prominent, hirsute to the tips, terminating bluntly as if cut off. A single genus and species in Europe, *Calpe capucina*, has apparently an American representative in *C. canadensis* Beth. I have not been able to study other genera, indicated by Guenée and figured by various writers. This tribe would seem to be tropical in its origin. The genus *Calpe* probably belonged to the tertiary circumpolar fauna, and is of so pronounced a form that the American and European descendants have retained a decided resemblance. I do not know that *Canadensis* has been bred or carefully compared with its European ally, but I was able to recognize type specimens among Mr. Walker's synonyms and somewhat confusing generic references in this family. Full and careful comparisons are needed in many cases to decide whether the species are representative or identical.

## PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 14, Volume xxii.)

*A. doris* Bdv.1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg.), 77, *Chelonia*.

Habitat—So. California.

I am not aware that any reference of this species to the rank of synonyms has been made. It refers almost certainly to one of our western species now known under another name. Mr. Grote has omitted the species from his list.

*A. edwardsii* Stretch.1873—Stretch, Zyg. and Bomb., 74, 77, pl. III., f. 9, *Arctia*.1883—Neum., Papilio, III., 149, = *achaia*?1887—Smith, Ent. Amer., III., 111, = *dahurica*.

Habitat—California.

*A. excelsa* Neum.1883—Neum., Papilio, III., 70, *Arctia*.1883—Hulst.,\* Bull. Bkln. Ent. Soc., VI., 69, = *nais*.

Habitat—No. Car., New York, Long Island.

Food plant—*Plantago major*.*A. elongata* Stretch.1885—Stretch, Ent. Amer., I., 105, *Arctia*.1885—Neum., Ent. Amer., I., 93, = var. *determinata*.

Habitat—Was. Terr.

The curious anomaly of a species being referred as a synonym before it was described arose from the fact that Mr. Stretch, basing his species upon Mr. Neumoegen's material, returned the specimens before sending in the papers for publication. Mr. Neumoegen, working on the genus, made the reference from the label, and both gentlemen sent in their papers for publication at nearly the same time.

*A. figurata* Drury.1770—Dru., Illustr., II., pl. XII., f. 4, *Bombyx*.1820—Pal., Beauv., Ins. Afr. et. Am., Lep., p. 265, pl. 24, f. 4, ♂,  
*Phalæna*.

- 1837—Westw., ed. Dru., Illustr., II., 22, *Nemeophila*.  
 1837—Harris, Cat. Ins. Mass., 73, *Arctia*.  
 1856—Wlk., C. B. Mus. Lep. Het. III., 625, *Nemeophila*.  
 1862—Clem., App. to Morris, Synops., 341, *Arctia*.  
 1865—Grt. & Rob., Ann. Lyc., N. Y., VIII., 368, *Arctia*.  
 1873—Stretch, Zyg. and Bomb., 74, *Arctia*.  
 1879—Graef,\* Bull., Bkln. Ent. Soc., I., 3, life hist.  
 1883—Hulst., Bull. Bkln. Ent. Soc., VI., 70, =*nais*.  
 1887—Smith, Ent. Amer., III., 114, an sp. dist.

*ceramica* Hbn.

- 1816—Hbn., Verz., 180, *Euplagia*.  
 1865—Wlk., C. B. Mus. Lep. Het., III., 625, pr. syn.  
 var. *franconia* Edw.

1887—Edw., Ent. Amer., III., 184, *Arctia*.

Habitat—Can., N. Y., Mass., Pa., Ills., D. C.

The distribution is undoubtedly wider, and, as certainly, some of the described species must fall in as forms of this.

*A. flammea* Neum.

- 1881—Neum., Papilio, I., 9, *Arctia*.  
 1883—Hulst., Bull. Bkln. Ent. Soc., VI., 70, =*nais*.  
 1883—Neum., Papilio, III., 149, =*placentia* var.  
 Habitat—Florida.

*A. f-pallida* Strk.

- 1879—Strk., Rept. Eng., 1878-79, v. V., p. 1860, pl. II., f. 3.  
 1883—Hulst., Bull. Bkln. Ent. Soc., VI., 70, =*nais*.  
 Habitat—Rio Navajo, Colo., July 13.

This is simply a variety of *figurata*, in which all the marking save those forming a distinct  $\omega$ , are obsolete. Any good series of *figurata* will show such specimens.

*A. geneura* Strk.

- 1878—Strk., Proc. Dav. Ac. N. Sci., II., 270, pl. IX., f. 5, ♂, *Arctia*.  
 1884—French, Papilio, IV., 158, ♂, *Arctia*.  
 1889—French, CAN. ENT., XXI., 162, *Arctia*.  
 Habitat—Colo. (Gilpin Co.), Mt. Shasta, Calif.

Mr. French seems rather inclined to believe that the California specimens may refer to a distinct species. There is a series of *geneura* in the

U. S. National Museum, and this species, *incorrupta* Edw., with all its variations and *nevadensis*, G. & R., are all forms of a single, not very variable species, of which *docta* is the Californian form, and perhaps specifically distinct. The material in the National Museum will go far towards settling the relationship of these forms. The description of new species would be therefore rather unwise until this material can be properly studied.

*A. michabo* Grt.

- 1875—Grt., CAN. ENT., VII., 196, *Arctia*.
- 1883—Neum., Papilio, III., 150, =*arge*.
- 1886—Grt., CAN. ENT., XVIII., 108, an sp. dist.
- 1887—Smith, Ent. Amer., III., 111, an sp. dist.
- Habitat—Nebraska, Dist. Col.

*A. nais* Dru.

- 1870—Drury, Illustr., I., pl. VII., f. 3, *Bombyx*.
- 1816—Hübner, Verzeichniss, 183, *Arctia*.
- 1823—Hübner, Zutr.,\* 300, ff. 599, 600, *Arctia*.
- 1837—Westw., ed. Drury, I., p. 15, *Spilosoma*.
- 1856—Wlk., C. B. Mus. Lep. Het., III., 609, *Arctia*.
- 1860—Clem., Proc. Ac. N. Sci., Phil., XII., 528, *Arctia*.
- 1862—Clem., App. to Morris Syn. 339, *Arctia*.
- 1864—Pack., Proc. Ent. Soc., Phil., III., 177, *Arctia*.
- 1868—Grt., Trans. Amer. Ent. Soc., II., 117, *Arctia*.
- 1868—Saund., CAN. ENT., I., 27, *Arctia*.
- 1873—Stretch, Zyg. and Bomb., 74, *Arctia*.
- 1876—Moeschl., Stett. Ent. Zeit., XXXVII., 296, *Arctia*.
- 1882—French,\* Papilio, II., 176, life hist.
- 1883—Hulst., Bull. Bkn. Ent. Soc., VI., 69, 120, *Arctia*.
- 1884—Bean,\* CAN. ENT., XVI., 65, *Arctia*.
- 1887—Smith, Ent. Amer. III., 111, *Arctia*.

*phalerata* Harris.

- 1837—Harris, Cat. Ins., Mass., 73, *Arctia*.
- 1841—Harris, Rept. Ins., Mass., 245, *Arctia*.
- 1862—Harris, Inj. Ins., Flint, ed. 347, f. 166, *Arctia*.
- 1863—Saund., Syn. Can. Arct., 11, *Arctia*.
- 1864—Pack., Proc. Ent. Soc., Phil., III., 177, *Arctia*.

1868—Grt., Trans. Amer. Ent. Soc., II., 117, pr. syn.

*radians* Wlk.

1856—Wlk., C. B. Mus. Lep. Het., III., 632, *Apantesis*.

1868—G. & R., Tr. Am. Ent. Soc., II., 72, pr. syn.

*colorata* Wlk.

1864—Wlk., C. B. Mus. Lep. Het., XXXI., 302, *Aloa*.

1868—G. & R., Trans. Amer. Ent. Soc., II., 85, pr. syn.

1876—Butl., Journ. Linn. Soc., XII., 432, = *radians*.

var. *incompleta* Butl.

1881—Butl., Ann. and Mag., N. H., Ser. 5, v. VIII., 311, *Arctia*.

Habitat—Can., U. S., generally.

The species has been recorded as a strawberry feeder. Mr. Butler's variety refers to one of those forms with the maculation partly obsolete, such as any decent series will show. The synonymy of Walker's species has been already referred to. The reference is rather to *decorata* Saund. than to *nais* Dru., but I have not much doubt of the identity of the two forms. There is, however, a species closely allied to *nais* in the National Museum collection, which is, I believe, as yet undescribed.

*A. nereia* Bdv.

1868—Bdv., Lep. Cal. (Ann. Soc. Ent. Belg., XII.), 77, *Chelonia*.

Habitat—California.

This species has disappeared from our lists. It is perhaps only a variety of *arge*, but I cannot find that it has been so referred.

*A. nevadensis* Grt. & Rob.

1866—Grt. & Rob., Proc. Ent. Soc., Phil., VI., 1, pl. 1, f. 1, ♂; *Arctia*.

1873—Stretch, Zyg. and Bomb., 74, *Arctia*.

1885—Neum., Ent. Amer., I., 93, —gives synonymy.

1886—Grt., CAN. ENT., XVIII., 109, *Arctia*.

*behrii* Stretch.

1873—Stretch, Zyg. and Bomb., 75, pl. 3, ff. 11 and 12, *Arctia*.

1873—Stretch, Zyg. and Bomb., 238, pr. syn.

var. *incorrupta* Hy. Edw.

1881—Edw., Papilio, I., 38, *Arctia*.

1883—Neum., Papilio, III., 71, 150, = *nevadensis*.

1885—Neum., Ent. Amer., I., 93, = *nevadensis*.

var. *sulphurica* Neum. Ent. Amer., I., 93, *Arctia*.

*ochracea* || Neum.

1883—Neum., Papilio, III., 71, *Arctia*.

1885—Neum., Ent. Amer., I., 93, *nomen bis lectum*.

var. *mormonica* Neum.

1885—Neum., Ent. Amer., I., 93, *Arctia*.

Habitat—Nevada, Arizona, Oregon, Calif.

As I have already indicated, I believe that *geneura* Strk. belongs to this series.

*A. obliterata* Stretch.

1885—Stretch, Ent. Amer., I., 105, *Arctia*.

Habitat—Unknown.

*A. ochreata* Butler.

1881—Butler, Ent. Mo. Mag., XVIII., 135, *Arctia*.

Habitat—United States.

Mr. Butler says his species is close to *phalerata*, and after carefully reading his description I believe he is right. At all events I cannot find anything in it that does not apply to *phalerata* as well.

*A. oithona* Strk.

1877—Strk., Lep. Rhop. et. Het., 131, *Arctia*.

Habitat—Texas.

This will turn out a remarkably close ally to *intermedia* Stretch, which is *not saundersii* Grote.

*A. pallida* Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 118, *Arctia*.

1873—Stretch, Zyg. and Bomb., 74, *Arctia*.

Habitat—New York.

The type is in the collection of the Am. Ent. Soc., where I have several times seen it. It is certainly not an *Arctia*, but perhaps nearer to *Seirarctia*.

*A. phyllira* Dru.

1770—Drury, Illustr., I., 15, pl. VII., f. 2, *Bombyx*.

1791—Oliv., Enc. Meth., V., 94, *Bombyx*.

1797—Abb. & Sm., \* Ins., Ga., II., 127, pl. 64, *Phalena*.

1816—Hübner, Verzeichniss, 180, *Euplagia*.

1820—Hübner, Zutraege, \*108, ff. 215, 216, *Euplagia*.

1837—Westw., ed. Drury, I., 15, *Callimorpha*.

- 1837—Harris, Cat., Ins., Mass., 73, *Arctia*.  
 1841—Harris, Rept. Ins. Mass., 245, *Arctia*.  
 1856—Wlk., C. B. Mus. Lep. Het., III., 610, *Arctia*.  
 1858—Wlk., C. B. Mus. Lep. Het., VII., 1780, *Arctia*.  
 1860—Clem., Proc. Ac. N. Sci. Phil., XII., 528, *Arctia*.  
 1862—Clem., App. to Morr. Synops., 339, *Arctia*.  
 1862—Harris, Inj. Ins., Flint ed., 347, *Arctia*.  
 1863—Saund., Syn. Can. Arct., 11, *Arctia*.  
 1876—Moeschl, Stett. Ent. Zeit., XXXVII., 296, *Arctia*.  
 1883—Hulst., Bull. Blkn. Ent. Soc., VI., 70, = *nais*.  
 1887—Smith, Ent. Amer., III., 111. an spec. dist.  
     var. *lugubris* Hulst.

1886—Hulst., Ent. Amer., II., 182, *Arctia*.

Habitat—Penn., N. Y., N. J., D. C., Can., Mass., Ills., Mo., Ga.

The distribution is wider—when the synonymy is once ascertained we can complete the record of occurrences.

(To be continued.)

## DESCRIPTION OF THE LARVA OF TRIRHABDA TOMENTOSA, L.

BY WM. BEUTENMÜLLER.

Body elongated, subcylindrical, rounded above and flattened beneath ; color above steel blue, with a series of transverse elevated ridges along the dorsum, two on each segment, and along the sides are three rows of tubercles, all steel blue. Body beneath, dirty brownish white ; cervical shield also steel blue.

Thoracic feet jet black, shiny ; abdominal and anal legs wanting.

Head small, subglobose, depressed in front ; shiny jet black.

Mandibles simple, short, stout, slightly excavate internally beneath the apex.

Maxillæ robust, cylindrical ; lobe rounded at the apex with a few bristles ; palpi three jointed ; first joint short, second joint somewhat larger, cylindrical, third joint conical, extending a little beyond the lobe.

Labium subtriangulate, palpi two-jointed, very short.

Antennæ very minute, hardly visible.

Length, about .10 mm ; width, about .3 mm.

Food-plants, various species of golden rods and asters. June ; single brooded.

NOTES ON THE INSECT FAUNA OF HIGH ALTITUDES IN  
CUSTER COUNTY, COLORADO.

BY T. D. A. COCKERELL, WEST CLIFF, CUSTER CO., COL.

The faunæ of high altitudes always possess a peculiar interest by virtue of the light they throw on problems of geographical distribution, and especially the distribution in ancient times of what is now a strictly Arctic and Alpine fauna. For this reason, the following lists of species, fragmentary as they are, may be of some value as a contribution to our knowledge of the Alpine fauna of Colorado, and for comparison with Arctic and Alpine faunæ in general. The species here enumerated were taken in 1887, 1888 and 1889, on the eastern slope of the Sangre de Cristo Range, in Custer County, Colorado. Three gulches have been explored, namely, (1) Smith's Park Gulch, on a fork of Brush Creek, (2) Horseshoe Bend Gulch, the next gulch south of No. 1, and (3) Swift Creek Gulch. The great majority of insects came from Smith's Park Gulch. The altitudes are from 10,000 to 12,000 feet. A large number of insects were taken about the Micawber Mine, which is possibly not quite 10,000 feet; but it cannot be far from it, so the species are included. A list of the fauna and flora of the same part of Custer County, *below* 10,000 feet, is now in course of publication in the "West American Scientist." A comparison of the two lists will show that the fauna of higher altitudes differs very materially from that of the valley:—

## COLEOPTERA.

These have been kindly identified by Dr. John Hamilton. They are classified according to locality and date of collection:—

- (1) Near Brush Creek, June 26 and 27, 1889—

*Dolopius lateralis* Esch.

*Podabrus lateralis* Lec.

*Orsodacna atra* var. *childreni* Kirby.

*Cicindela longilabris* Say.

*Acmaeops proteus* Kirby.

*Adoxus vitis* L.

*Dichelonycha backii* Kirby.

*O. childreni* and *D. backii* were common. *A. vitis* had the thorax black, and elytra reddish-fulvous.

- 
- (2) Near Micawber Mine, 1889—  
*Chrysobothris trinervia* Kirby. A small example.
- (3) Horseshoe Bend Gulch, August 15—  
*Chrysomela continua* Lec. Many specimens on flowers of  
*Gymnolomia multiflora*.
- (4) Near Micawber Mine, Aug.—  
*Lachnosterna* sp. ♀ (fragment).  
*Coccinella transversoguttata* Fald.  
*Trichodes ornatus* Say.  
*Buprestis nuttallii*? (flying by day; not caught).
- (5) Micawber Mine, Aug. 7, 1889—  
*Acmaeops pratensis* Laich.  
*Adoxus vitis* L.  
*Zeugophora abnormis* Lec.  
*Anthobium* sp.  
*Mordella melæna* Germ.  
*Leptura propinqua* Bland.  
“ *subargentata* Kirby.  
*Anaspis rufa* Say.  
*Homalota* sp.  
*Mordella scutellaris* Fab.
- (6) Smith's Park Gulch, Aug. 5—  
*Cardiophorus tenebrosus* Lec.
- (7) Near Micawber Mine, Aug. 4—  
*Leptura propinqua*.  
*Athous ferruginosus* Esch.
- (8) Timber line above Smith's Park Gulch, Aug. 5—  
*Dasytes hudsonicus* Lec.
- (9) Near Micawber Mine, Aug. 6—  
*Phyllotreta pusilla* Horn. n. sp.  
*Hippodamia convergens* Guér.  
*Glyptina atriventris* Horn, n. sp.  
*Platystethus americanus* Erichs.  
*Leptura propinqua* Bland.  
*Adoxus vitis* L.  
*Leptura subargentata* Kirby.

## HYMENOPTERA.

All the Hymenoptera have been submitted to Mr. W. H. Ashmead. The types of the new species are in his collection, and will be described by him.

(1) Near Brush Creek, June 27, 1889—

*Bombus rufocinctus* Cr.

*Prosapis basalis* Smith, ♂.

*Oryssus occidentalis* Cr.

*Rhodites spinosellus* Ckll., n. sp.

*Limneria tibiator* Cr.

*Odynerus leucomelas* Sauss.

*Macrophya albipictus* Ashm., ♂, ♀.

*Camponotus* sp.

*Orthocentrus leucopsis* Ashm.

*Eurytoma diastrophii* Welsh, ♀.

Of *R. spinosellus* only the round pickly leaf-galls were found.

(To be continued.)

## CORRESPONDENCE.

## CHRYSLIDS DEVoured BY CATERPILLARS.

*Dear Sir:* A few days ago I found a number of *Pyrameis cardui* larvæ, and also several (4) of the common, reddish brown, hairy caterpillars (*Spilosoma Isabella*), so often seen about gardens in the fall feeding on plants of the common garden hollyhock (*Althea rosea*). Not having extra boxes to spare, I placed both species in a roomy pasteboard box, with a plentiful supply of hollyhock leaves. In the course of a day or two several of the *cardui* larvæ hung themselves to the corner of the box, and in a short time three were transformed to chrysalids. What was my surprise on looking into the box this morning to see if any more had hung or transformed, to find the reddish brown caterpillars had devoured two of the *cardui* chrysalids, and one of the caterpillars was actually engaged eating the third, and had consumed fully one-half of it. This was not done from lack of food, as there was an *abundance* in the box. Here, then, is a new source of destruction to our butterflies—a sort of cannibalism among caterpillars.

SHELLY W. DENTON, Wellesley, Mass.

---

EREBIA EPIPSODEA VAR. SINE-OCCELLATA Skinner.

*Dear Sir:* Is not this variety (CAN. ENT., p. 239) identical with var. *brucei* Elwes, (Trans. Ent. Soc. Lond., 1889, June, p. 326), described as smaller, without ocelli, the red band almost obsolete? *Brucei* was described from high altitudes in Colorado, so it is interesting to have it re-appearing at lower levels in N. W. Ter. Mr. W. H. Edwards has kindly sent me the *Epipsodea* plate of his Butt. N. A., whereon are beautiful figures of *Brucei* and the early stages of the species.

Dec. 16, 1889. T. D. A. COCKERELL, West Cliff, Custer Co., Col.

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## GRAPTA INTERROGATIONIS.

*Dear Sir:* I beg to record the capture by myself of a beautiful specimen of *Grapta interrogationis* at Cote St. Antoine, Montreal, on the 11th of July. Its sluggishness and perfect condition showed that the insect had but just emerged from the chrysalis. *G. interrogationis* is extremely rare in the Province of Quebec. Tradition says that it had been, once upon a time, taken at Lachine—a few miles away; but for twenty-five years I have looked vainly for it.

South Quebec, Oct. 16, 1889.

THOMAS W. FYLES.

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## THE CORN SAW-FLY.

*Dear Sir:* The occurrence in America of *Cephus pygmaeus* Curtis, known in England as the Corn Saw-fly, may be worth a special record. In 1887, among insects taken by sweeping in a meadow, I found a *Cephus* not agreeing with any of the described American species. Mr. Ashmead has fully identified it as *C. pygmaeus*. In some Hymenoptera received from Mr. VanDuzee a few days ago, I find three specimens, all females, and taken at Buffalo—two on 9th June, 1888, and the other on 11th June, 1889. This shows that the occurrence of the species is not accidental, and that it is already widely distributed. Possibly next season we may hear of injuries inflicted by it upon wheat fields.

W. HAGUE HARRINGTON, Ottawa.

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EDITED BY

REV. C. J. S. BETHUNE.

PORT HOPE, ONTARIO.

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# The Canadian Entomologist.

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No. 3.

## POPULAR AND ECONOMIC ENTOMOLOGY.

### THE MEDITERRANEAN FLOUR MOTH (*Ephestia kühniella*, ZELLER).

BY JAMES FLETCHER, OTTAWA.

During the summer of 1888 considerable anxiety was caused amongst North American millers by the alarming intelligence that the small Pyralid moth, bearing the name given above, had made its appearance in one of our large Canadian milling centres. There are two or three well-known insects which attack manufactured cereal products; but none of these, have ever occurred in injurious numbers in Canada. When, therefore, it was learned that a large warehouse, twenty-five feet wide, seventy-five feet deep and four stories high, had been completely over-run by the caterpillars of a new insect, which had infested all the flour and other manufactured foods therein contained, and had rendered much valuable machinery temporarily useless, it naturally caused much excitement lest the pest should spread to other mills; nor did this excitement abate when it was announced that the new comer was the same species as had been causing so much loss and trouble in English and European mills during the last ten years. The attack was so severe that it became necessary to close the mill where the outbreak occurred, and also to destroy a large quantity of goods. The insects in all stages were to be found in every part of the building. The cocoons were found adhering to the walls, joists, shelves and ceiling. Every crack or nail hole in the wood-work, machinery and furniture throughout the whole building was found to contain caterpillars or cocoons, and the moths were flying about in thousands. The attention of the Ontario Government was called to

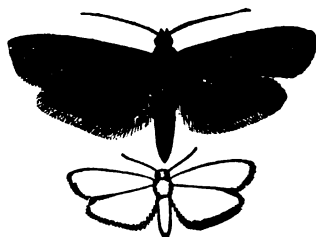


FIG. 2.

the matter in August last, and, under instructions from the Hon. Charles Drury, the Minister of Agriculture, prompt and vigorous steps were taken by Dr. P. H. Bryce, Secretary of the Provincial Board of Health, to ensure the extermination of so dangerous a visitor, which has been described as "the scourge of the Mediterranean ports." Dr. Bryce's investigations and the methods he adopted have been published in Bulletin I. of the Provincial Board of Health. This pamphlet, which is written in a clear, intelligible manner, and is illustrated with figures\* of the insect in its various stages, will certainly be of great use to millers in showing them how to recognize and wage war against the insect should they meet with it upon their premises. Other valuable sources of information on this subject are Miss E. A. Ormerod's article in her Twelfth Report (pp. 66-72), and Prof. Riley's article in "Insect Life" (Vol. II., pp. 166-171). The object of the present note is to draw the attention of our readers to the subject, so that the gravity of the case may be recognized and prompt advice sent either to our Society or to the Ontario Government in case of further outbreak occurring in other parts of the Province. The perfect moth is a slender species about half an inch in length, with the wings folded close to the body when at rest. The upper wings are of a leaden grey colour, more or less sprinkled with black scales and crossed by three waved dark lines, two near together at the tip and the other a little nearer the shoulder than the middle of the wing. Just beyond the middle and in the centre of the wing is a black dot (sometimes two). The under wings are greyish-white, edged by a dark line, and all the wings are conspicuously fringed. The eggs, which are about  $\frac{1}{60}$  of an inch in length, are oblong, bluntly rounded at the ends, or sometimes rather kidney-shaped. Under the microscope they are pretty objects, being covered with rather large but indistinct star-shaped prominences, the rays (or wrinkles) of which are waved. As a rule the eggs are laid singly, but sometimes in strings of from three to fourteen, connected at their ends. In nature they are probably laid on the outside of sacks, or are possibly pushed in between the meshes by means of the long ovipositors of the females. One female confined in a glass bottle closed with a plug of cotton batting had forced her eggs into the cotton plug to a depth of over  $\frac{1}{4}$  of an inch. When first laid the eggs are greenish-

\*Fig. 2, showing *E. kuhniella* enlarged, and of the natural size in outline, is kindly lent by Dr. Bryce.

white, after about twelve days they turn purplish, and in nineteen days (in September and October) the young caterpillars eat their way out of the eggs.

When first hatched they are reddish-brown, with dark heads, slender, hairy, and very active. They at once begin to spin a silken thread wherever they go. When full grown the caterpillar is three-quarters of an inch in length, slender and cylindrical; of a greenish-white, but pink where the skin overlaps. The head is reddish-brown. Upon the segment next to the head, and on the last segment, are two chitinous plates of a honey-yellow colour, known, respectively, as the thoracic and anal shields. Along the sides of the body are four rows of dark piliferous tubercles, the most distinct of which are those upon segments 2, 3 and 13. These tubercles are arranged in four series, as follows:—Subdorsal (two on each segment, from 5 to 12), lateral, substigmatal, and supra-ventral. The substigmatal series is double throughout, each tubercle bearing two bristles, separated a little at the base. On segments 3, 4 and 13 the subdorsal and lateral series are represented by a single double tubercle instead of two separate tubercles, as on the other segments.

These tubercles are small but distinct, the dark colouring is in the form of a cloud round the bases of the bristles. On the anterior section of segment 13, the two subdorsal rows of tubercles are joined by a dark cloud, and there is a large double conspicuous tubercle in the lateral area. When full-grown the caterpillars crawl to some crevice or corner and enclose themselves in close cocoons, into which they spin particles of flour dust, or any other material at hand. The chrysalis is honey-yellow at first, but turns darker as the moth matures within it. In about three weeks the moths appear, pairing takes place and eggs are laid within 24 hours.

*Remedies.*—As to remedies, these will have to be applied according to circumstances. In the attack above referred to, all machinery was brushed and subjected to a blast of super-heated steam. Fumigation, with sulphur and chlorine, was also resorted to. The experience of all who have had the misfortune of being visited by this pest is, that the only safeguard is scrupulous cleanliness. In Canada, where we have several months consecutively of severe winter weather, there should be no very great difficulty in keeping this pest down if millers will only recognize the danger of being indifferent. It is hardly probable that cold will kill

the insects if they are left undisturbed in their silken tunnels ; but, if these are broken by constant sweeping, and the caterpillars are left exposed, cold will certainly injure them. Moths and caterpillars placed in a glass bottle, and exposed to a temperature of five degrees above zero (Fah.), were all severely crippled, and did not recover. The above facts suggest the advisability of occasionally opening mills, which are supposed to be infested, so that the cold of winter may penetrate. If the moths are seen about in spring, fumigating with sulphur at short interval must be practised. Old sacks received from outside sources should be carefully examined, as these would probable be the most frequent means of carrying the pest from one mill to another. It is probable that this insect passes the winter in the caterpillar state, in which it is more or less active, according to the temperature.

### SOME NEW COLORADO MOTHS.

BY G. H. FRENCH, CARBONDALE, ILL.

*Cossus Brucei*, nov. spec.

Expanse, male 2.50, female 3.00 inches.

Ground color, very pale gray, almost white, no dusky shading over the wing. Fore wings crossed by a great number of fine black lines. In the male none of these form reticulations except a few along the basal half of the internal vein and near the outer margin. The female has a few more of the reticulations in the outer third of the wing. On the male one line more prominent than the rest crosses the wing through the middle from the costa to the posterior margin at the origin of the fourth median vein, forming a straight line. On the female this line follows the fourth median vein about a tenth of an inch, and then goes in a straight line obliquely to the margin, and is not so heavy as in the male. Both sexes have a sub-terminal line not quite so prominent as the median, from near the apex to the posterior angle, bifid on costa, nearly straight in the male, slightly curved outwardly in the female, reaching the angle in a fine line. Veins dark only as denuded. Hind wings, with a space at the base and along

the inner margin, covered with long hairs as usual, the rest reticulated ; of the same color as the fore wings.

Head gray, darker in the male ; collar slightly more buff tinted than the ground color of the wings, making a light drab, without marks ; thorax gray, a mixture of the ground color of the wings and black, a black line round the posterior margin preceded by a space devoid of black ; abdomen of a lighter gray than the thorax. Beneath the thorax and abdomen concolorous with the same parts above, the legs ringed with light.

This species is nearest to *Cossus Angrezi* Bailey, but differs from that in several particulars. It lacks the dark shading on the fore wings, in the shape and distinctness of the transverse median line on fore wings, and in the shape and position of the subterminal line. The fore wings are a little less rounded at the apices, otherwise they are shaped alike. The hind wings in this species are reticulated over the terminal two-thirds, while in *Angrezi* the reticulations do not cover quite half. In *Angrezi* the thorax is black, with the edge of the tegulae shaded with yellowish gray ; in this the thorax and tegulae are both gray. The antennae are pectinated in both sexes, most heavily so in the male. The under side of the wings repeat the markings of the upper side, but a little blurred. The space between the two transverse lines is a little shaded with brownish. The female has the ovipositor exerted about .30 of an inch.

Described from two examples, one of each sex, taken by David Bruce, in Colorado, in 1887, and in the name dedicated to him.

*Totype distincta*, nov. spec.

Expanse, male 1.12 1/2, the female 1.50 inches.

Male.—In color and markings between *Velleda* and *Laricis*, rather a dark leaden gray ; the fore wings crossed by two geminate lines and a subterminal line, similar to those of *Velleda*, but the subterminal line is also inclined to be geminate. These lines are lighter than the ground colour, but not white as in *Velleda*. The geminate lines bordered each side by a shade line that is slightly brownish ; fringes concolorous, a whitish gray line at the base. Hind wings nearly the color of fore wings, a pale shade through the middle and at the outer border ; fringe like that on fore wings.

Head and thorax gray, the front a little mixed with brown, the middle of thorax with the usual glossy brown scales in the form of a longitudinal crest; abdomen gray, brown tinted, the sides at the base white, beneath a little paler than above; antennæ strongly pectinate.

Female.—Color and markings as in the male, the bands and veins a little more decided in contrast of color with the wings. Thorax dark leaden gray, patagiae rather lighter gray than the wings; the entire absence of white anywhere.

This species is between *Velleda* and *Laricis* in size, as well as markings and colour. The antennæ are strongly pectinate, more so than *Laricis*, but not so much as *Velleda*. There is no decided white on either sex, except on the sides of the abdomen of the male, the cross bands and veins of the fore wings being whitish gray. The fringe of the fore wing show a tendency to be paler at the ends of the veins, but they are not pale externally, as are those of *Velleda*.

Captured by Mr. David Bruce, in Colorado, and described from two males in my cabinet, and one female in that of Mr. Bruce.

*Halisidota occidentalis*, nov. spec.

Expanse, 1.30 inches.

Fore wings hyaline, except the anterior part to subcostal vein, the base, and the posterior part along the submedian vein and a little above that at the base. The costal space alternately four patches of yellow, between a buff and a chrome yellow, and yellowish brown; the posterior margin alternately two spots each of the yellow and brown, the basal yellow and the terminal brown spots the longest. From the costal brown spots three irregular sub-hyaline brown bands extend across the wing, the two outer connecting with the two brown spots on the posterior margin, the third from the outer margin not reaching the margin but blended posteriorly with the second; the sub-basal brown spot on the costa is in line with a red-brown spot on the median vein at base; the subhyaline brown, is darker than that on the costa. The hyaline spaces left between these brown bands corresponds to the light bands in such species as *Agassizii*, etc. Veins brownish yellow, as also the extreme outer portion of the wing. Hind wings hyaline, immaculate; fringes of both wings pale.

Head pale yellowish brown, a yellow transverse stripe in front, antennæ

pectinate, pale yellow-brown. Thorax yellow buff; collar, a dorsal line and a line on outer edge of patagiae brown, the edge of collar next to head yellow; abdomen yellow; beneath pale yellow, with the front of anterior legs brownish.

Described from one male taken by Mr. Bruce, in Colorado.

*Halisidota subalpina*, nov. spec.

Expanse, 1.55 inches.

Fore wings yellow-buff, so sprinkled with brown scales as to appear quite brown, crossed by six rows of spots that are part yellow and part white, all except the costal surrounded by a brown annulus. The first row is of two spots, the first on costa and the second on median vein, all yellow; the second row is of three, the first large and at right angles to the other two very small white ones; the third row is of five spots, the costal yellow, the next three white, the second very small, the third and fourth equal, the fifth yellow and lacking the basal part of annulus; the fourth row is of five spots, the costal yellow, the second large and in the cell white, the third a brown spot, the other two small, white; the fifth row of six spots all white except the costal, the first and second only separated by the vein, the sixth very small; the sixth row is of nine spots, all white but the costal, the first, second and ninth very small, the seventh and eighth tending to fuse, the ninth removed inward out of line with the others. The last spot in four of these rows is below the submedian vein. Fringes brown, with buff at the ends of the veins. Hind wings pale buff, a pale stain spot at the end of cell and at the apex.

Head yellow in front, brown between the antennæ, antennæ pale yellow brown; collar buff, a central line and a spot each side brown; thorax buff, a brown line each side of the centre; centre of patagiae pale buff, with a brown line each side, the two uniting in front; abdomen buff. Beneath similar to the upper but paler, the abdomen with a central and lateral brownish stripe, the costa of hind wings with three brown stains.

Collected in Colorado by Mr. David Bruce. Described from one male. This species is near *H. Scapularis* Stretch, but differs in size, colour and markings. In *Scapularis* all the spots are white, and the ground color is brown, with the thorax brown instead of buff. These are a few of the differences between the two species.

NOTES ON *EREBIA EPIPSODEA*, BUTLER.\*

*Epipsodea* was first known to me by examples taken by Mr. T. L. Mead, in Colorado, 1871. He says, in Report of the Wheeler Expedition: "This species inhabits the mountains of Colorado below timber line. Specimens were brought from Fairplay by the Expedition. It begins to appear about the first week in June, is common by the middle of that month, and remains until the last of July."

Several examples were received in 1883, by Mr. William M. Curtis, from Judith Mountains, Montana, at about 4,000 feet elevation, in July. From Mr. Ernest Stevenson, at Walla-Walla, southeast Washington, came some unusually large specimens, late in June, 1885; others from Spokane Falls, in east Washington, by Dr. W. J. Holland. I have also received this species from St. Michaels and Nushagak, Alaska; and have received eggs from Mr. Thomas E. Bean, at Laggan, Alberta. On the other hand, I have not seen *Epipsodea* from south Colorado, or New Mexico, or Arizona, or Utah, nor from the Sierra Nevada range anywhere. So far as appears, it is confined to the Rocky Mountains from middle Colorado northward to the Arctic sea, but flies over the lowlands in its northernmost range, and may there have a wide distribution. Many examples from Colorado are small, the wings expanding less than any seen from Alaska; and the largest have come from Washington. Throughout its territory the two principal varieties seem to be found, the banded and not banded.

Mr. Butler described the species from two individuals "from Rocky Mountains," but the locality was not stated.

Mr. Bruce writes: "I first met with *Epipsodea* in Platte Canon, Colorado, at about 9,000 feet elevation. It frequents damp and boggy places where the grass grows rank and coarse. In such situations, up to nearly 12,500 feet, I found it rather common. In one place, at the highest altitude named, a small stream of muddy water from a mine had been conveyed in wooden troughs which emptied into a basin-like depression; in this place, being always moist, the grass and flowers grew luxuriantly, and many species of butterflies were in profusion. *Epipsodea* was plenty, and in almost all the examples I captured here, the ocelli on

\*From Edwards's Butt. N. A., Vol. 3, Part IX., issued Feb. 1, 1890. As comparatively few of our readers are likely to see this work, we have thought it worth while to reprint these interesting notes.—ED. C. E.

upper wings were absent. Many had none on lower wings, others showed black points more or less minute.

"This variety, which Mr. Elwes has called *E. Brucei* I see, is probably peculiar to these high stations, where I have found it during three seasons, for, in the valley below, there was a narrow, boggy tract, more than a mile long, where *Epipsodea* was plentiful; but I found none of the variety spoken of. The only variation there was marked by the absence of the band on under side hind wings, and this was confined to few individuals.

"*Epipsodea* has a rather quick, jerky flight. It is not very readily captured, for, although it never appears to be in a great hurry, it flies close to the ground, and is always just ahead, dodging under every bush, and around every grassy hummock, as if in earnest search for something. It takes long flights without going far away, and seldom alights on flowers. Directly the sun is obscured, it dives in the grass, like almost all the mountain diurnals. All the *Erebias*, as well as the alpine species of *Chionobas*, 'play possum,' and pretend to be lifeless when captured, and will lie in or under the net, or on one's hand, some moments in that condition. I have found *Epipsodea* from June 9th to the end of August, in the front Range, in Colorado; at the latter date it was badly worn."

Mr. Elwes says, Tr. Ent. Soc., Lond., 1889, Part II, p. 334: "I have a single specimen, and Mr. Godman has a similar one, collected by Bruce in Cashier Valley, Summit County, Colorado, at 12,000 feet, which are considered by Bruce and W. H. Edwards to be a variety of *Epipsodea*, though it is so different from it that, had I more specimens, I should be inclined to consider it a different species, more especially as *Epipsodea* does not appear to extend to such great elevations, or to vary much; though its range of altitude is very great. I have taken it in Idaho at about 2,000 feet elevation, and in the Yellowstone Park at 5,000 to 6,000 feet, and have it from Colorado, taken by Bruce, as high as 9,500 feet. The specimens above mentioned are somewhat smaller, and with rounder wings, than the average of *Epipsodea*, but are best marked by the entire absence of ocelli on either wing or on either surface, and the partial disappearance of the red band." In the Synopsis of same paper, page 326, Mr. Elwes puts this under the species name as "? Var. *Brucei*."

Mr. Bean writes: "At Laggan, *Epipsodea* is moderately common in June and early July, frequenting open, grassy flats of the Bow River valley,

at an altitude of about 5,000 feet. It is, in my experience, rarely found on the mountains, but I took a single male, the past season on a mountain ridge, at 7,800 feet, or about 500 feet above the tree line. This specimen does not differ from those of the valley, 3,000 feet below. The form you mention (*Brucei*), which partly lacks the eye spots, I do not find.

"*Epipsodea* occurred at McLean, altitude 1,900 feet, in 1884, though not so common as it is at Laggan, and the localities were open grassy flats."

The eggs sent me by Mr. Bruce, in 1888, were laid by a female of this var. *Brucei*, not wholly destitute of spots, there being two or three black points on fore wings. The outcome was a single male, true type *Epipsodea*, scarcely banded beneath, out of chrysalis 12th May, 1888. The eggs were laid 8th July and hatched 20th. On 25th, there were seven young larvæ. The first one passed first moult 27th July, the second moult 4th August, the third moult 28th August. The others lingered in their stages, but by 15th September, five had passed third moult. They were at all times kept out of doors, and cool weather now coming on they ceased feeding gradually. On 29th October, I found but three larvæ, all in lethargy, two of the five having disappeared. In November, I took them to Clifton Springs, as before stated. On 5th April, 1888, I received them again, two alive and wide awake as I opened the box. These were at once placed on grass, and in five minutes thereafter were feeding. On 15th April, one passed its fourth moult, the other on 17th. On 30th April, I noticed that one was bringing together leaves of the grass and forming a sort of loose cylinder. It was in the middle of a pretty dense tuft, the leaves of which were three to four inches long. On one of these the larva rested, holding by its prolegs, and was spinning a few threads and drawing the leaves down and about it. Before night the inclosure was complete. Nearly a score of leaves were held, mainly by threads at top and bottom, that is, above and below the larva, making a pretty close covering, but open by spaces so that most of the side, and the head, were exposed to view. The larva rested head up, back arched. Mr. Scudder, in But. N. E., has well characterized this structure as "an imperfect cocoon." Pupation took place on the night of 1st-2d May. Some hours after, when the chrysalis had hardened, I cut away the leaves one by one. There were fifteen of them, and the pupa rested upright, its lower end one and a-half

inch above ground, in an angle formed by three leaves. As I cut one of these, it turned over and fell, showing itself to be unattached. In fact the cremaster was found to be furnished with but straight bristles, very short, and there were no hooks by which attachment could be had. As before stated, a male of the typical form came from this chrysalis on 12th May.

I had received young larvæ of this species from Mr. Bean, at Laggan, 25th July, 1886, they having hatched *en route*. I lost all but one of these. It passed first moult 2d August, the second moult 10th August, and soon after became lethargic. I kept it at Coalburgh, and brought it into the house middle of January, 1887, apparently healthy. But a month later it unaccountably disappeared.

Mr. Bruce had also sent eggs from Colorado which reached me 28th July, 1886. From these, five larvæ reached second moult, and went into hibernation, and died during the winter. From the behavior of the different lots of larvæ, it appears that hibernation may take place at either second or third moult.

This, therefore, is the complete history of an *Erebia* from egg to imago, and, so far as I know, the first such that has ever been published of one of the genus. To get drawings of the several stages, it was necessary to send them to Mrs. Peart, at Philadelphia, through the mails, some five hundred miles, with risk of loss or damage. Indeed, the second larva was in Philadelphia in its last stage, and being returned to me, imperfectly pupated on the way, and died.

The genus *Erebia* comprises many species, nearly all of which are European and Asiatic. Dr. Staudinger, in 1871, enumerated forty-eight, many of them boreal, others alpine, the latter found as far to the south as the Pyrenees, Alps, Caucasus, and Himalayas. Great Britain is credited with three species, and, in Buckler's *Larvæ of British Butterflies*, Vol. I, on Plate VI, are figured the mature larva and pupa of one of these, *E. Blandina*, and the young larva of another, *E. Cassiope*. In the text, Mr. Buckler relates that he raised the larva of *Blandina* from the egg, obtaining pupa and imago; and a brief description of the several stages is given, that of the larval being imperfect, as nothing is said of the several moults. Nor is it told how the larva pupated. Nevertheless, the plate represents the pupa resting nearly upright on a tuft of grass, but not at all inclosed. It looks very much like the pupa of *Epipsodea*. So an incomplete des-

cription is given of the stages of *Cassiope*, but how pupation took place is not told, nor is there a figure shown. The young larva as figured has forked tails, and therefore, I apprehend, it must have been drawn after the first moult.

In North America, are eight or nine species, three at least of which are said to be old world, namely, *Tyndarus*, *Discoidalis*, and *Disa*. One species heretofore erroneously credited to North America, on the authority of Doubleday, *E. Vesagus*, belongs to the Andes, in South America.

The group is a very interesting one, and together with Chionobas, and some others, embraces those members of the Rhopalocera, or Diurnals, which are nearest the Heterocera, or Moths, allied to them in important characters in each of the four stages. The resemblances of the larvæ and pupæ are particularly striking. The latter are destitute of cremastral hooks in *Erebia*, in *Chionobas*, even of bristles, and pupation takes place, sometimes on the bare ground, sometimes in or on the sod, in one case, as we have seen, in an imperfect cocoon; sometimes in a real cocoon beneath the surface of the ground; or the larva goes into the ground and pupates naked, in a cavity made by the movements of its body, after the manner of nearly all the Sphingidæ.\*

## PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 36, Volume xxii.)

### *A. placentia* A. & S.

1797—A. & S.,\* Ins. Ga., II., 129 pl., 65, *Phalaena*.

1816—Hübner, Verzeichniss, 180, *Heraclia*.

1856—Wlk., C. B. Mus., Lep. Het., III., 610, *Arctia*.

1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 529, *Arctia*.

1862—Clem., App. to Morris, Syn. 337, *Arctia*.

1863—Saund., Syn. Can. Arct. 5, *Arctia*.

\*NOTE.—Since the foregoing paper was printed, I have seen the CAN. ENT. for December, 1889, and learn therefrom (Vol. XXI., p. 238,) that Dr. H. Skinner has received examples of *Epipsodea*, caught in Assiniboia, about 325 miles west of Winnipeg, and with them one of the var. *Brucei*, mentioned as var. *Sine-ocellata*.

- 1873—Stretch, Zyg. and Bomb., 74, *Arctia*.  
1883—Hulst, Bull. Bkln. Ent. Soc., VI., 70, = *nais*.  
1883—Neum., Papilio, III., 150, *an sp. dist.*  
Habitat—Georgia, Canada.

*A. quadrinotata* Strk.

- 1878—Strk., Proc. Dav. Ac. N. Sci., II., 271, pl. IX., f. 6.  
Habitat—Texas.

*A. quenselii* Geyer.

- 1830—Geyer, Zutr. No. 424, ff. 847–848, *Arctia*.  
1849—Moeschl, Stett. Ent. Zeit. IX., 173, 174, *Euprepia*.  
1856—Wlk., C. B. Mus., Lep. Het., III., 611, *Arctia*.  
1858—Wlk., C. B. Mus., Lep. Het., VII., 1780, *Arctia*.  
1860—Clem., Proc. Ac. N. Sci. Phil., XII, 527, *Arctia*.  
1862—Morris, Synopsis, 223, *Arctia*.  
1864—Gn., Ann. Soc. Ent. Fr. 1864, 4e trim., *Nemcophila*.  
1866—Pack., Proc. Bost. Soc. N. H., XI., 34, *Arctia*.  
1873—Stretch, Zyg. and Bomb, 74 et 222, pl. IX., f. 8 (♀).  
1874—Pack., \*Rept. Geol. Surv., 1874, 558, f. 14 (larva).  
1887—Smith, Ent. Amer., III., 109, *Arctia*.

*gelida* Moeschl.

- 1849—Moeschl, Stett. Ent. Zeit., IX., 174, *Euprepia*.  
1856—Wlk., C. B. Mus., Lep. Het., III., 611, *Arctia*.  
1860—Clem., Proc., Ac. N. Sci. Phil., XII., 528, *Arctia*.  
1862—Clem., App. to Morris Syn., 341, *Arctia*.  
1873—Stretch, Zyg. and Bomb., 74, *Arctia*.  
1873—Streck., Lep. Rhop. et Het., 23, pr. syn.  
1883—Moeschl., Stett. Ent. Zeit., XLIV., 116, pr. syn.  
1883—Neum., Papilio III., 150, pr. syn.  
Habitat—Labrador, White Mts., Col.

*A. rectilinea* French.

- 1879—French, CAN. ENT., XI., 45, *Arctia*.  
1887—Smith, Ent. Amer., III., 110, *Arctia*.  
Habitat—Illinois, New York.

*A. remissa* Edw.

- 1888—Edw., Ent. Amer., III., 184, *Arctia*.  
Habitat—H. B. Terr.

*A. rhoda* Butl.1881—Butler, Ent. Mo. Mag., XVIII., 135, *Arctia*.

Habitat—United States.

This species bears the same relation to *ochreata* Butl. that *decorata* Saund. does to *nais* Dru., and Mr. Butler suggests that it may be the female of either *phalerata* Harr., or *ochreata* Butl.

*A. saundersii* Grt.1864—Grt., Proc. Ent. Soc., Phil., III., 75 et 324, pl. 4, f. 3, ♂, *Arctia*.1868—Saund., CAN. ENT., I, 27, *Arctia*.1873—Stretch, Zyg. and Bomb., 74, *Arctia*.1881—Butler, Papilio, I., 131, *Arctia*.1883—Hulst, Bull. Bkln. Ent. Soc., VI., 71, *parthenice*.1883—Neum., Papilio, III, 149, an sp. dist. *parthenice*.1887—Grt., Ent. Amer., III, 147, *Arctia*.1887—Grt., CAN. ENT., XIX., 32, an sp. dist. *parthenice*.  
*virguncula* † Saund.1863—Saund., Syn. Can. Arct., 9, *Arctia*.

1864—Grt., Proc. Ent. Soc., Phil., III, 75, pr. syn.

*intermedia* Stretch.1873—Stretch, Zyg. and Bomb., 216, pl. IX., f. 3, *Arctia*.

1875—Grt., CAN. ENT., VII., 197, pr. syn.

1883—Neum., Papilio, III., 150, an sp. dist.

1887—Smith, Ent. Amer., III., 110, an sp. dist.

Habitat—Can., N. Y., Mass., N. J., Ills.

Mr. Stretch's species *intermedia* is certainly not referable to *saundersii*, but to *stretchii* Grt. and *oithona* Strk.

*A. simplicior* Butler.1881—Butl., Ann. and Mag., N. H., ser. 5, VIII., 311, *Arctia*.

"Possibly a well marked variety of *A. achaia*; but apparently intermediate between that species and *A. saundersii*." So says Mr. Butler.

Habitat—Oregon.

*A. snowi* Grt.1875—Grt., CAN. ENT., VII., 197, *Arctia*.1883—Hulst, Bull. Bkln. Ent. Soc., VI., 70, = *nais*.

Habitat—Kansas.

*A. shastaensis* Behrens.1889—French, CAN. ENT., XXI., 35, *Arctia*.1889—French, CAN. ENT., XXI., 162, fig. ♀, *Arctia*.

Habitat—Mt. Shasta District, Cal.

*A. speciosa* Moeschl.1865—Moeschl., Wien. Ent. Monatschr, VIII., 195, pl. V., ff. 13-14  
*Arctia*.1866—Pack., Proc. Bost. Soc. N. H., XI., 34, =*quenselii*.1873—Strk., Lep. Rhop. et Het., I., 23, *Arctia*.1874—Pack., Rept. Geol. Surv., 1874, 558, *quenselii* var.1883—Neum., Papilio, III., 150, =*quenselii*.

Habitat—Okak, Labr., White Mts.

(To be continued.)

NOTES ON THE INSECT FAUNA OF HIGH ALTITUDES IN  
CUSTER COUNTY, COLORADO.

BY T. D. A. COCKERELL, WEST CLIFF, CUSTER CO., COL.

(Continued from page 39, Volume xxii.)

## (2) Near Micawber Mine, Aug. 6—

*Lysiphlebus salicaphidis* Ashm.*Lipolexis chenopodiaphis* Ashm.*Limneria montana* Cr.*Periclistus* sp.*Apanteles* sp.*Diaeretus atricornis* Ashm.*Megachile* sp.*Andrena* sp.*Halictus* sp.*Sapyga aculeata* Cr.*Camponotus vicinus* Mayr.

" sp.

*Perilampus platygaster* Say.*Habrocytus rosæ* Ashm.*Passalæcus mandibularis* Cr.*Lysitermus coloradensis* Ashm.*Aspilota obscuripes* Ashm.

- Aphidius montanus* Ashm.  
 " *atropetiolatus* Ashm.  
*Sphecodes dichroa* Smith.  
*Prosapis affinis* Smith.  
*Formica integra* Nyl.  
*Dolichopselphus* n. g., n. sp., Ashm.
- (3) Near Micawber Mine—  
*Pteromalus vanessæ* Harris. Bred from a pupa of *Vanessa*. The larva of *P. vanessa* is about  $2\frac{1}{2}$  mill. long, and is tinged with purplish. The pupa is pale yellow, with the eyes red and very conspicuous.
- (4) Timber line and above, above Smith's Park Gulch, Aug. 5—  
*Bombus ternarius* Say.  
*Habrocytus rosæ* Ashm.  
*Nomia nortoni* Cr.  
*Atractodes* sp.
- Mr. Ashmead remarks, concerning *H. rosæ*: "I first received this species from Messrs. James Fletcher and Harrington, who reared it from a rose-gall collected in British Columbia." I have reared it from galls of *Rhodites ignota* O. S., and *R. fusiformans* Ckll., n. sp., collected at West Cliff.
- (5) Near Micawber Mine, Aug. 4—  
*Tapinoma sessile* Say.  
*Lipolexis atriventris* Ashm.  
*Habrocytus rosæ* Ashm.  
*Leptacis tetraplasta* Ashm.  
*Psilophrys occidentalis* Ashm.
- (6) Smith's Park Gulch, Aug. 5—  
*Calliopsis* sp.  
*Tenthredo occidentalis* Cr.  
 " *ferrugineipes* Cr.  
*Cremastus* sp.  
*Tapinoma sessile* Say.  
*Bracon sulcifrons* Ashm.  
*Aphidius atropetiolatus* Ashm
- (7) Micawber Mine, Aug. 7—  
*Lampronota coloradensis* Cr.

*Camponotus* sp.

*Formica* sp.

*Cremastus* sp.

*Passalæcus mandibularis* Cr.

*Figites coloradensis* Ashm. ♀.

*Apanteles* sp.

*Aspilota pallidipes* Ashm.

*Pimpla annulipes* Brullé.

(8) Horeshoe Bend, 1887—

*Urocerus flavicornis* Fl.

*Dolichoselphus* Ashm., is allied to *Attractodes*, with abnormally lengthened maxillary and labial palpi.

#### LEPIDOPTERA.

Mr. W. H. Edwards has kindly examined many of the butterflies. The two species of *Cidaria* were identified by the Rev. G. D. Hulst.

(1) Lakes of the Clouds, 1887—

*Colias meadii* Edw.

(2) Near Micawber Mine, 1888—

*Nathalis iole* Bdv.

(3) Near Brush Creek, June 27, 1889—

*Phyciodes camillus* Edw.

*Nisoniades icelus* Lintn.?

*Argynnis hesperis* Edw.

*Lycæna sæpiolus* Bdv., ♂, ♀.

" *oro* Scudd.

(4) Near Micawber Mine, June 27—

*Pyrameis cardui* L.

" " form *minor* Ckll., nov.

*Anthocharis ausonides* Bdv.

*Vanessa milbertii* var. *subpallida* Ckll.

*Pieris oleracea* Bdv.

*Gnophaela vermiculata* Grote.

*Agrotis auxiliaris* Grote.

*Papilio rutulus* Bdv.

*Colias scudderii* Reak.

*Lycæna acmon* D. and H.

*P. cardui* f. *minor* differs from the type only in being much smaller.

A *P. rutulus* was caught at the flowers of *Erysimum asperum* var. *alpestre* v. nov.

- (5) Timber line above Smith's Park Gulch, June 27—

*Limenitis weidemeyerii* Edw.

*Chionobas chryxus* West. and Hew.

*Colias eurytheme* Bdv.

*C. chryxus* was abundant, but difficult to capture because it flew over exceedingly precipitous and rocky ground.

- (6) Horseshoe Bend Gulch, June 27—

*Argynnis Edwardsii* Reak.

*Grapta* sp.

*Vanessa antiopa* L.

- (7) Timber line above Smith's Park Gulch, Aug.—

*Brenthis* sp.

*Parnassius smintheus* Dbl. and Hew.

- (8) Smith's Park Gulch, August—

*Brenthis* sp.

*Colias alexandra* Edw. ♂.

*Chrysophanus helloides* Bdv.

*Gnophaela vermiculata* Grote ♂, ♀.

*Limenitis weidemeyerii* Edw.

- (9) Near Micawber Mine, Aug.—

*Gnophaela vermiculata* Grote.

*Cidara montanata* Moesch. (Aug. 15).

“ *nubilata* Pack. (Aug. 4).

*Pyrameis cardui* L.

*Vanessa antiopa* L.

*Parnassius smintheus* D. and H.

*Limenitis weidemeyerii* Edw.

*Alucita hexadactyla* L.

*Grapta* sp.

*Pieris protodice* B. and L., ♂ (Aug. 6).

*Chrysophanus helloides* Bdv. (abundant).

*Nomophila* sp.

*Botys* sp.

*Metrocampa margaritata* var. *perlata* Guèn. (Aug. 6).

*Plusia* sp.

*Clisiocampa* sp.

*Colias alexandra* Edw., ♂, ♀

*Pieris occidentalis* Reak. (Aug. 6).

*Satyrus charon* Edw.

*Colias eurytheme* var. *pallida* Ckll.

" " var. *keewaydin* Edw. (Aug. 6).

" " var. *eriphyle* Edw. (Aug. 6).

(10) Horseshoe Bend Gulch, Aug. 15—

*Colias eurytheme* Bdv.

#### ORTHOPTERA.

*Ceuthophilus* sp., near Micawber Mine.

#### HEMIPTERA.

The Hemiptera have been identified by Mr. Ashmead.

(1) Smith's Park Gulch, 1889—

*Cicada* sp.

(2) Timber line above Smith's Park Gulch, Aug. 5—

*Nysius californicus* Stal.

(3) Smith's Park Gulch, Aug. 5—

*Lygus diffusus* Uhler.

" *pratensis* L., var.

(4) Near Micawber Mine, Aug. 6—

*Podisus bracteatus* Fitch.

*Nysius angustatus* Uhler.

*Anthocoris melanocerus* Reuter.

*Corizus hyalinus* Say.

*Hadronema militaris* Uhler.

" *robusta* Uhler.

(5) Timber line above Smith's Park Gulch, July 27—

*Lioderma viridicata* Uhler?

(6) Micawber Mine, Aug. 7—

*Lygus pratensis* L., var.

*Idiocerus alternatus* Fitch.

*Pycnoderes insignis* Reuter.

(7) Near Micawber Mine, Aug. 15—

*Alydus eurinus* Say.

(8) Near Brush Creek, June 27—

*Dacota hesperia* Uhler.

*Lygus pratensis* L., var.

## DIPTERA.

*Tipula* sp., Micawber Mine, Aug. 7.

*Musca domestica* L., near Micawber Mine, Aug. 6.

*Culex* sp., Lakes of the Clouds, 1887.

Various other species of Diptera, etc., as well as some *Trichoptera*, and species of *Thrips* and *Tomocerus* (probably *plumbeus* L.), and many Aphides, are as yet undetermined. The Arachnida are represented by *Epeira* and *Misumena* (probably *vatia*), and *Phalangodes robusta* Pack. was found near the Micawber Mine, this being the highest altitude known for this species. The Myriapoda are represented by species of *Lithobius* *Geophilus* and *Julus*, and most interesting of all, *Polydesmus* was found near the Micawber Mine.

BIBLIOGRAPHY.—The only species hitherto recorded from 10,000 feet, or above, on the Sangre de Cristo Range, seem to be *Parnassius*, *Gnophaela*, *Brenthis* and *Bombus*. But some not very distinct ranges have been explored. Many species are recorded from Veta Pass, and Mr. Scudder has written (Appalachia, 1878) on the insects of Sierra Blanca, and Mr. W. S. Foster has collected Lepidoptera on Marshall Pass.

## CORRESPONDENCE.

## RARE CAPTURES.

*Dear Sir* :—When in London last winter, I assisted in naming the private collection of Mr. Rowland Hill, our present young curator. As I was going over his material, my attention was arrested by the unfamiliar look of a few specimens he had secured the season before; they had a resemblance to a familiar enough form—*Lachnosterna*—but much smaller, and I concluded that I had seen it before. After several ineffectual efforts to secure its name, I sent a specimen to Dr. Hamilton, Allegheny, and he has identified it as *Cyclocephala immaculata* Burm., and remarks that “this species is widely distributed from Ohio to West Mexico, but I never heard of its being taken in the Northern States, east of North-western Ohio.” I have also been in communication with Prof. Fernald, and I copy the following from his reply:—“No. 2 is *Pædisca nisella* Cl., a European species never before reported in the United States.”

J. ALSTON MOFFAT, Hamilton, Ont.

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# Canadian Entomologist

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REV. C. J. S. BETHUNE.

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VOL. XXII. LONDON, SEPTEMBER, 1890.

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No. 9.

## A SUGGESTION AS TO THE GENERIC NOMENCLATURE OF INSECTS.

BY T. D. A. COCKERELL, LONDON, ENGLAND.

Mr. Scudder's recent admirable work on the butterflies of New England has, naturally enough, given rise to fresh discussion of the question of generic nomenclature, without, however, leading to any very decisive result. Mr. Scudder's views on the sub-division of hitherto-accepted generic units are certainly extreme, and probably few will be found to follow him entirely. On the other hand, many no doubt feel that Mr. W. H. Edwards's genera require some sort of sub-division, and would compromise matters by admitting some, and rejecting others, of Mr. Scudder's divisions. Mr. Edwards himself, in his 1884 catalogue, has numbered sub-divisions of many larger genera; thus of *Lycæna* we get groups I. to VII. But these numbers are not adopted by others, partly because different authors treat the subject differently, thus creating confusion, and partly because it is not easy or convenient to use a number instead of a name.

So we come to this conclusion: It is necessary that the larger genera should be sub-divided, but it is highly undesirable to call all those sub-divisions genera. We therefore need a system of section or group-names which shall be uniform, used generally,—not, like the numbers, variable according to the fancy of the author,—and yet not of the nature of genera or sub-genera.

In the treatment of *Carex* by the botanists I think we see a similar problem solved. *Carex* is a huge genus, which even after a reasonable amount of subgeneric division, needs further grouping to be made intelligible. So, Fries, Drejer, Tuckerman and others have proposed section-names: *Flexiles*, *Paniceæ*, *Sigitatæ*, etc. These names are always in the plural, and have nothing to do with sub-genera or genera properly speaking, nor does any trouble arise about priority, provided the name has not been used before in the same genus. The groups may not

be all of equal value, and there are sections again sub-divided into sections. This system is not new, and I believe it to be very useful, allowing us to recognize the natural sub-divisions of genera, without being obliged to make genera of them. I have already adopted these section-names in a list of North American land-shells now ready for printing, and have thereby been able to reduce the number of so-called sub-genera without refusing to notice the natural groups they represent. I derived my section-names when convenient from a prominent species of the group, or in other cases, by adopting a descriptive term, or turning a sub-generic name into a plural section-name.

Before writing this paper, I wrote to Mr. W. H. Edwards, telling him of my idea for getting out of the present difficulty. He comments favourably on the suggestion, and writing of Mr. Scudder's "genera," made by sub-division of *Colias*, etc., he says: "I consider them groups merely, or sub-groups. All *Anthocharis*, I think, should be one [genus], all *Argynnis* one, all *Colias* one. If numbers can't be accepted, I am perfectly willing to try the section-names as you suggest \* \* \*. By-and-by I propose to give a new edition of my catalogue, and then I may adopt the plan throughout. It would save us from fifty genera in *Pamphila* at once." (*in litt.*, May 17, 1890.)

Should Mr. Edwards decide to adopt section-names, we can hardly do better than leave him to decide about the sections and choose appropriate names; but to illustrate the point I will here treat a few "genera" as proposed:—

| W. H. EDWARDS.             | SCUDDER.    | PROPOSED SECTION-NAME. |
|----------------------------|-------------|------------------------|
| Papilio, group V.          | Jasoniades. | Turni.                 |
| Colias, group I.           | Zerene.     | Cæsoniæ.               |
| Vanessa, pars.             | Eu Vanessa. | Antiopæ.               |
| Pamphila, group II., pars. | Erynnis.    | Erynnæ.                |
| Thecla, group IV., pars.   | Incisalia.  | Incisaliæ.             |
| Lycæna, group V.           | Rusticus.   | Rustici.               |
| Chrysophanus, group III.   | Heodes.     | Chrysophanuli.         |

As will be seen, the first three names are taken from prominent species; the second three from the so-called genera, and the last from a character of the group. It may be found advisable, at least as often as possible, to adopt the name from a species; but some specific names, as *poweschiek*, *pawnee*, etc., would be rather difficult to render plural, not to

speak of the objection to increasing the use (as section-names) of such extraordinary appellations. The plural termination, I should think, ought always to be Latinised.

The same principle may, of course, be applied to other groups of insects. Such genera as *Agrotis*, *Pterostichus*, *Tipula*, *Bombus*, etc., might be well sectionised.

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PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 168, Volume XXII.)

*E. elegans* Str.

1873—Stretch, Zyg. & Bomb., 189, pl. 8, f. 6, *Euchaetes*.

1875—Butler, Cist. Ent., II., 37, *Euchaetes*.

1876—Stretch, Wheeler's Rept. Surv., west 100 mer., V., 797, pl. 40, ff. 5 and 6, *Euchaetes*.

1882—Grt., CAN. ENT., XIV., 196, *Euchaetes*.

Habitat—California, Owens Valley.

*E. immaculata* Graef.

1887—Graef., Ent. Amer., III., 42, *Euchaetes*.

Habitat—Florida.

*E. inopinatus* Hy. Edw.

1882—Edw., Papilio, II., 13, *Euchaetes*.

Habitat—Florida.

*E. murina* Stretch.

1885—Stretch, Ent. Amer., I., 106, *Euchaetes*.

1887—Graef., Ent. Amer., III., 142, *Euchaetes*.

Habitat—Arizona, Texas.

*E. oregonensis* Stretch.

1873—Stretch, Zyg. & Bomb., 187, pl. 8, f. 7, *Euchaetes*.

1874—Lint.\*, Ent. Cont., III., 145, *Euchaetes*.

Habitat—Oregon, Texas, New York.

*E. perlevis* Grt.

1882—Grt., CAN. ENT., XIV., 196, *Euchaetes*.

1882—Grt., Papilio, II., 131, *Euchaetes*.

Habitat—Arizona.

*E. pudens* Hy. Edw.1882—Edw., Papilio, II., 126, *Euchaetes*.1882—Grt., CAN. ENT., XIV., 196, *Euchaetes*.

Habitat—Texas.

*E. scepisiformis* Graef.1887—Graef, Ent. Amer., III., 43, *Euchaetes*.

Habitat—Texas.

*E. spraguei* Grt.1875—Grt., CAN. ENT., VII., 200, *Euchaetes*.1877—Grt., CAN. ENT., IX., 85, *Euchaetes*.1882—Grt., Papilio, II., 111, *Euchaetes*.1882—Grt., CAN. ENT., XIV., 196, *Euchaetes*.

Habitat—Kansas, Texas.

*E. vivida* Grt.1882—Grt., Papilio, II., 131, *Euchaetes*.1882—Grt., CAN. ENT., XIV., 196, *Euchaetes*.

Habitat—South-western Texas.

*E. yosemite* Hy. Edw.1883—Edw., Papilio, III., 146, *Euchaetes*.

Habitat—San Jose Valley, California.

*E. zonalis* Grt.1882—Grt., Papilio, II., 131, *Euchaetes*.1882—Grt., CAN. ENT., XIV., 196, *Euchaetes*.

Habitat—Arizona.

The genus *Vanessodes* G. & R., which Mr. Grote inserts in this place seems to be a *Lithosian*. I cannot demonstrate ocelli in any specimens I have examined. The venation and habitus is also *Lithosiform* rather than *Arctiid*.

## Genus ARACHNIS Hbn.

1837—Hübner, Zutræge, 457.

1873—Stretch, Zyg. &amp; Bomb., 83.

Head very small, retracted; palpi small; tongue short and weak, not longer than the head. Legs short and stout; tibiæ with the spurs normal in number, but very short.

Primaries with 7 to 10 on a stalk, 10 branching a very short distance from the end of the subcostal, 7 to 9 branching rather beyond the middle of the common vein; 3, 4 and 5 almost equidistant from the end of the median.

Secondaries with 6 and 7 forking from the subcostal slightly before the end of the cell; 3, 4 and 5 very close together from the end of the median.

The antennæ are simple in both sexes, and the tarsal claws are also simple.

*A. picta* Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 126, *Arachnis*.

1873—Stretch\*, Zyg. & Bomb., 83, pl. 3, f. 6, ? = *aulæa*.

1876—Moeschl., Stett. Ent. Zeit., XXXVII., 298, *Arachnis*.

Habitat—California, Colorado.

Food plant—Lupinus sp.

*A. aulæa* Geyer.

1837—Geyer, Zutraege, 913, 914, *Arachnis*.

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 526, *Arachnis*.

1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 78, *Ecpantheria*.

1873—Stretch, Zyg. & Bomb., 86, *Arachnis*.

1876—Moeschler, Stett. Ent. Zeit., XXXVII., 298, *Arachnis*.

*incarnata* Wlk.

1855—Wlk., C. B. Mus., Lep. Het., III., 690, *Ecpantheria*.

1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 524, *Ecpantheria*.

1865—Wlk., C. B. Mus., Lep. Het., XXXI., 300, *pr. syn.*

Habitat—California, Mexico.

Whether we have here to do with one or two species is a question? Packard, in describing his species, does not refer to *aulæa* at all. Moeschler says the difference between the two is that in *picta* the costal margin of primaries beneath is yellow, whereas in *aulæa* it is red. Whether or not the Mexican form is different from the Californian examples must be settled by those who have the material. All the California specimens I have ever seen refer to the *picta* variety.

Genus EUERYTHRA Harv.

1876—CAN. ENT., VIII., 5.

1887—Smith, Proc. U. S. Nat. Mus., X., 335.

Head moderate in size, scarcely retracted ; tongue weak ; palpi small, longer in the ♀. Antennæ of ♂ bipectinated, of the ♀ simple. Legs almost equal in length, spurs normal in number but short.

Primaries with 7 to 10 stalked, out of the same point with 6 from the end of the subcostal ; 3, 4 and 5 from the end of the median, 4 more remote from 3 than from 5.

Secondaries without costal vein, subcostal extended some little distance beyond the end of the cell and forking to give off 6 and 7 ; 3, 4 and 5 from the end of the median, 5 rather more remote from 4 than is 3.

For further details I would refer the student to my paper in Proc. U. S. Nat. Mus., X., 335.

*E. phasma* Harv.

1876—Harv., CAN. ENT., VIII., 5, *Euerythra*.

1887—Smith, Proc. U. S. Nat. Mus., X., 336, *Euerythra*.

Habitat—Texas.

*E. trimaculata* Smith.

1887—Smith, Ent. Amer., III., 17, *Euerythra*.

1887—Smith, Proc. U. S. Nat. Mus., X., 336, *Euerythra*.

Habitat—Texas.

The two species are closely allied, but are, I believe, distinct.

Genus ECPANTHERIA Hbn.

1816—Hübner, Verzeichniss, 183.

1855—Walker, C. B. Mus., Lep. Het., III., 668.

1862—Morris, Synopsis, 347.

1873—Stretch, Zyg. & Bomb., 174.

Tongue very short and weak. Legs short and stout, subequal in length ; middle and posterior tibiæ with minute terminal spurs only. Tarsi short, the claws split nearly to the base in both sexes. Antennæ of the male serrate, of the female simple.

Primaries with 6 to 10 stalked out of the end of the subcostal, 6 branching off almost immediately, 10 a little further on, 7 more than half way to apex, while 8 and 9 divide just before the apex ; 3, 4 and 5 from the end of the median, 4 nearer to 5 than to 3.

Secondaries with 8 from the subcostal unusually close to base ; 6 and

7 from the same point at the end of the subcostal ; 4 and 5 from the same point at end of median, 3 very close to the same source.

The wing form of the genera has not been described very generally in these notes, but in this genus it may be added that the secondaries are disproportionately small and tend to become caudate.

*E. permaculata* Pack.

1872—Pack., 4th Rept. Peab. Ac. Sci., 86, *Leucarctia*.

*reducta* Grt.

1877—Grt., Bull. U. S. Geol. Surv., III., 799, *Ecpantheria*.

1887—Bruce, Ent. Amer., III., 14, *Ecpantheria*.

*cæca* Strk.

1884—Strk., Proc. Ac. Nat. Sci., Phil., XXXVI., 283, *Ecpantheria*.

Habitat—Colorado, Arizona, So. California.

Dr. Packard's term *permaculata* seems to have become lost in some way. It is not referred to in Mr. Grote's list, and Mr. Edwards does not mention it in his additions in Ent. Amer., III. It refers without doubt to the *reducta* of Grote. Mr. Bruce has taken it quite abundantly in Colorado.

*E. scribonia* Stoll.

1787—Stoll\*, Sup. to Cramer's Pap. Ex., f. 177, pl. 41, f. 3, *Phalæna*.

1816—Hbn., Verzeichniss, 183, *Ecpantheria*.

1825—Hbn., Samml. Ex. Schmett., pl. 403, *Ecpantheria*.

1855—Wlk., C. B. Mus., Lep. Het., III., 689, *Ecpantheria*.

1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 523, *Ecpantheria*.

1862—Harris\*, Injurious Insects, 349, *Ecpantheria*.

1862—Clem., App. to Morris, Syn., 347, *Ecpantheria*.

1863—Saund\*, Proc. Ent. Soc., Phil., II., 28, *Ecpantheria*.

1863—Saund\*, Syn. Can. Arct., 22, *Ecpantheria*.

1864—Pack., Proc. Ent. Soc., Phil., III., 127, *Ecpantheria*.

1868—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 78, *Ecpantheria*.

1872—Riley\*, 4th Rept. Ins. Mo., 141, ff. 63, 64, *Ecpantheria*.

1873—Stretch\*, Zyg. & Bomb., 174, pl. 7, ff. 20 (♂) and 21 (♀),

*Ecpantheria*.

1882—Saund\*, CAN. ENT., XIV., 113, f. 12 and 13, *Ecpantheria*.

1888—Slosson, Ent. Amer., III., 185, *Ecpantheria*.

*oculana* Fabr.

- 1775—Fabr., Syst. Ent., 564, *Bombyx*.  
 1781—Fabr., Sp. Ins., II., 177, *Bombyx*.  
 1787—Fabr., Mant. Ins., II., 112, *Bombyx*.  
 1791—Oliv., Enc. Meth., V., 44, *Bombyx*.  
 1793—Fabr., Ent. Syst., III., 1, 425, *Bombyx*.  
 1797—Sm. Abb., Ins. Ga., II., 137, *Phalæna oculatissima*.  
 1855—Wlk., C. B. Mus., Lep. Het., III., 689, *pr. syn.*  
*oculatissima* Sm. Abb.  
 1797—Sm. Abb\*, Ins. Ga., II., 137, pl. 69, *Phalæna*.  
 1841—Duncan, Nat. Libr., XXXII., pl. 30, f. 4.  
 1864—Pack., Proc. Ent. Soc., Phil., III., 127, *pr. syn.*  
*cunegunda* Cramer.  
 1782—Cram., Pap. Exot., IV., 104, pl. 344, f. D. E., *Phalæna*.  
 1805—DeB., Ins. Afr. et. Am., 134, pl. 24, f. 4, *Bombyx*.  
 1865—Grt. & Rob., Ann. Lyc., N. Y., VIII., 368, *pr. syn.*  
 var. *denudata* Slosson.  
 1888—Slosson, Ent. Amer., III., 212, *Ecpantheria*.  
 Habitat—Canada to Florida, to Texas, to California.  
 Food plant—Omnivorous.

I do not see why the term *oculana* Fabr. should not be restored for this species, but do not make the substitution lest there be some reason I have not yet discovered, to prevent it. Walker makes the reference, but retains the later name. Packard cites Walker, but does not refer at all to *oculana*, although *oculatissima* is referred to in the synonymy. Smith and Abbot refer to *oculana* as identical with their form, and also cite Cramer's figure of *cunegunda*, which also antedates *scribonia*.

*E. sennettii* Lint.

- 1884—Lintner, Papilio, IV., 147, *Ecpantheria*.  
 Habitat—Texas.

#### Genus NELPHE Boisd.

I do not know this genus at all, either autoptically or by description. The only described American species is :

*N. carolina* Hy. Edw.

- 1886—Edw., Ent. Amer., II., 166, *Nelphe*.

(To be continued.)

## NOTES ON ARGYNNIS FREYA, CHARICLEA AND MONTINUS.

BY H. H. LYMAN, MONTREAL.

As is well known to readers of the CANADIAN ENTOMOLOGIST, Mr. Scudder, in his sumptuous work on the Butterflies of New England recently published, stated that Mr. Edwards had confused the two northern species, *Argynnis Freya* and *Chariclea*. This was denied by Mr. Edwards in the April number of this journal and Mr. Butler's authority was invoked to prove that Mr. Scudder had himself transposed these names. Here the matter rests, but as I think that I can throw some additional light on the question I shall endeavour to do so.

In the preface to Mr. Scudder's work he states that "twenty years ago the present work was definitely planned, announced and begun and the greater part of it has been written for fifteen years," though he adds that much of it was rewritten within the past few years.

On page X. of the same preface, in speaking of the appendix in which certain butterflies not found in New England are described, he says: "It was, however, an afterthought not entering into the original plan \* \* \* it has, indeed, been written during the printing of the work." This fact that the first volume was written fifteen or more years ago and the third only last year, no doubt explains the contradictory statements in reference to the affinities of *Argynnis Montinus* which appear in these volumes.

On page 604 of the first volume Mr. Scudder, in speaking of *A. Montinus*, says: "This species is certainly distinguishable from *B. chariclea* (Schneid), or *B. chariclea boisduvalii* (Somm.), both of which forms have been found by Mr. Couper on the northern shore of the Bay of St. Lawrence. Whether it should be looked upon merely as a geographical race, or as a species, is a question about which there may be easy difference." This certainly implies a very close connection between these forms, and in the original description of *Montinus*, in Scudder's "List of the Butterflies of New England," published in the Proceedings of the Essex Institute in April, 1863, reference to which he curiously enough omits from his recent work, he began his description with "Very similar to *A. Chariclea*."

So far so good, but on turning to the appendix in the third volume, page 1807, under the heading of *Brenthis freija* Thunb., which is the same as *Freya* Hübn., he says: "This species is very closely allied to

*B. Montinus*." Now, these two statements are quite irreconcilable, for while it is quite true that some so-called species stand so close together that a third may be quite correctly described as very close to both, this is certainly not the case with the species in question, which are very distinct. I think it will therefore be conceded that Mr. Scudder is wrong in one of these statements, and we can therefore proceed to examine which is erroneous, and I believe it will be found that in this case second thoughts were not best.

Both *Chariclea* and *Freya* occur in Europe and have been studied and illustrated by European entomologists. *Freya*, or *Freija*, is figured and described in Boisduval's *Icones*, p. 100, pl. 19, fig. 4, 5, and in the same work there is a description and figure (p. 98, pl. 20, fig. 5, 6) of *A. Boisduvalii*, which all the authorities that I have been able to consult, with possibly one exception, concede to be but a variety of *Chariclea*. Both of these references were omitted by Kirby from his catalogue and the former was overlooked by both Edwards and Scudder, but both are given in Strecker's catalogue. The figures in Boisduval's work, though inferior to those to which Messrs. Edwards and Scudder have accustomed us, are still sufficiently accurate to prove that it is truly *Chariclea*, as stated by Mr. Scudder in his first volume, to which *A. Montinus* is allied.

Mr. Scudder also makes the mistake of giving, doubtfully it is true, *M. Tarquinius* Curtis as a synonym of *A. Boisduvalii*, while all the other authorities give it as a synonym of *Freya*. From its description in the appendix to the "Narrative of Sir John Ross," it must certainly be very close to *Freya*, and is probably identical with it, but it has no connection with *Chariclea* or its variety, *Boisduvalii*. It thus appears that Mr. Scudder must have confused these species, and so transposed their names, a very curious mistake, and apparently similar to that which he formerly made in regard to *Phyciodes Harrisii* and *Nycteis*, to which I called his attention in 1878.

As there are doubtless many readers of this journal who are not familiar with these northern species of *Argynnis*, a few descriptive notes may not be out of place.

*Chariclea* may be described as somewhat like *Myrina* upon the upper side, though the markings are heavier, especially upon the secondaries, and it is rather more deeply shaded at the bases of the wings. There is, however, a very striking difference in the fact that in *Chariclea* the cres-

cent-shaped markings on the hind wings open outwards, while in *Myrina* they are much lighter and open inwards. There is, of course, no similarity between these species on the under side.

*Freya* is strikingly different from *Chariclea* upon both the upper and the under surfaces. Above the colour is duller and the bases of the wings are very heavily shaded; in fact, in the case of the secondaries, this shading extends over nearly the half of the wing. In *Chariclea* the black so-called mesial band is composed of a series of almost straight bars placed rather irregularly, while in *Freya* it is made up of a series of deep lunules. A like difference may be observed on the secondaries, but it is not quite so marked. On the under side of primaries similar differences are observable, although the markings are lighter; but the under side of secondaries show the most marked differences, for the beautiful band of pearly lunules crossing the wings just outside of the mesial black band in *Freya* has no counterpart in *Chariclea* and the course of the black band in its deep lunules is also very distinct.

There are many other points of difference between these species, but it is not very easy to indicate them clearly without going into a tedious description.

Mr. Scudder's descriptions of these species being reversed, what he says of *Freija* belongs really to *Chariclea*, and *vice versa*. These descriptions are given in great detail and are generally correct, but contain several curious errors. For instance, in describing the primaries of his *Freija*, but really *Chariclea*, he says: "Within the mesial band are three narrow transverse bands crossing the cell, the innermost not reaching the median nervure; within these is a small lunule opening outward." Surely he should have said inward, as the concave side of the lunule is towards the base of the wing. I might also allude to the fact that he says that the mesial band starts "a little beyond the middle of the costa"; as it really starts at a point very nearly two-thirds from the base of the wing I consider his statement rather loose for a man as particular as Mr. Scudder is known to be. Similarly in describing *Freya*, or *Freija*, he says that the black mesial band of primaries starts at the middle of the costa, while it is really not less than three-fifths from the base. In describing this form he omits to mention the small lunule inside the three bars crossing the cell, though it is recognizable, at least in my specimens, in spite of the heavy shading just inside of it, and he also fails to observe that the

black mark below the first divarication of the median nervure is angulated in a similar manner to that in the other species. But the most curious statement is that which he makes in speaking of the underside of primaries, where he says that "the sagittate spots are more delicate, and the nervules beyond them are distinctly yellowish or white," whereas these yellowish or white lines are on the creases forming the centres of the interspaces and not on the nervules at all.

There are other slips in these two descriptions, but mention of these is sufficient to show that Mr. Scudder's descriptions, though laboured, are not always quite accurate. Mr. Scudder also speaks of these species as flying—one in May, or early in June, and the other late in August, or early in September. At Laggan, however, where my specimens were collected by Mr. Bean, the difference of seasons was not so marked, as *Freya* was obtained May 11th and 16th, and *Chariclea* June 29th to July 18th. The latter occurs, however, later than this, and is doubtless found up to the end of August.

ON THE LISTS OF COLEOPTERA PUBLISHED BY THE  
GEOLOGICAL SURVEY OF CANADA, 1842-1888.

BY W. HAGUE HARRINGTON, OTTAWA.

(Continued from page 160, Vol. xxii.)

SCARABÆIDÆ.

*Onthophagus Hecate* Panz. A.O., W., S.M.

*Aphodius fossor* Linn. St.L.

*validus* Horn. W.

*fimetarius* Linn. A.O., St.L., T.L.

*ruricola* Melsh. W.

*foetidus* Fab. T.L.

*pectoralis* Lec. B.C.

*granarius* Linn. S.M.

*leopardus* Horn. Y.F., N.O., O.

*Geotrupes Egeriei* Germ. A.O.

*Dichelonycha subvittata* Lec. A.O., St.L.

*Backii* Kirby. B.C., M.

*Serica tristis* Lec. S.M.

- Diplotaxis brevicollis* *Lec.* B.C.  
*Lachnosterna fusca* *Fröh.* L'O., St.L., B.C., S.M.  
*Osmoderma eremicola* *Knoch.* L'O.  
     *scabra* *Beauv.* A.O.  
*Trichius piger* *Fab.* A.O.  
     *affinis* *Gory.* N.O., W., S.M., O.K.

## SPONDYLIDÆ.

- Spondylis upiformis* *Mann.* B.C.

## CERAMBYCIDÆ.

- Orthosoma brunneum* *Forst.* (unicolor *Drury*). L'O.  
*Asemum atrum* *Esch.* B.C.  
*Criocephalus agrestis* *Kirby.* N.C., Y.F., C.L., S.M., O., N., C.R.  
*Tetropium cinnamopterum* *Kirby.* O.  
*Gonocallus collaris* *Kirby.* C.R.  
*Hylotrupes ligneus* *Fab.* [*Physocnemum*]. St.L., O.  
*Phymatodes dimidiatus* *Kirby.* B.C.  
*Merium proteus* *Kirby.* B.C., Y.F., N.O., C.L., O., N., C.C., C.R.  
*Xylotrechus undulatus* *Say.* N.C., N.O., C.L., S.M., O., N., C.R.  
*Neoclytus muricatus* *Kirby* [*leucozonus* *Lap.*]. N.O.  
*Desmocerus palliatus* *Forst.* S.M.  
*Encyclops cæruleus* *Say.* A.O.  
*Rhagium lineatum* *Oliv.* O.  
*Pachyta monticola* *Rand* (*Evodinus*). A.O.  
     *liturata* *Kirby.* B.C., C.L., N.  
*Achmæops proteus* *Kirby.* A.O., N.O., O., C.R.  
     *pratensis* *Laich.* N.C., N.O., S.M.  
*Leptura subargentata* *Kirby.* B.C., N.C.  
     *var. similis* *Kirby.* N.O.  
     *sexmaculata* *Linn.* N.C., O., C.R.  
     *nigrella* *Say.* C.R.  
     *canadensis* *Fab.* A.O., O.K.  
     *chrysocoma* *Kirby.* N.C., S.M.  
     *proxima* *Say.* A.O.  
     *vittata* *Germ.* A.O.  
     *pubera* *Say.* A.O., S.M.

- mutabilis Newm.* A.O.  
*aspera Lec.* S.M.  
*Monohammus maculosus Hald.* S.M.  
*scutellatus Say.* A.O., St.L., N.C., Y.F., N.O., S.M., M., H.M.,  
M.F., O.K., O., N., C.R.  
*race oregonensis Lec.* B.C.  
*confusor Kirby.* A.O., St.L.  
*marmorator Kirby.* H.M.  
*Pogonocherus penicellatus Lec.* H.M., O.K., O.  
*mixtus Hald.* N.C.  
*Saperda vestita Say.* L'O.  
*tridentata Oliv.* A.O.

## CHRYSOMELIDÆ.

- Donacia pubicollis Suffr.* O.K.  
*palmata Oliv.* A.O.  
*hirticollis Kirby.* C.L., M.F., N.  
*magnifica Lec.* C.L., C.C.  
*proxima Kirby.* N.O., C.L., M.F., C.C., R.A.  
*subtilis Kunze.* A.O., C.L., H.M., C.C., R.A.  
*æqualis Say.* O.K.  
*cuprea Kirby* [*pusilla Say.*]. A.O., T.L., N.  
*aurea* [P misprint for *aurifer Lec.*, =*var. cuprea*]. M.F.  
*flavipes Kirby.* A.O., T.L.  
*Orsodacna atra Ahr.* [*Childreni Kirby.*] B.C., N.C.  
*Syneta ferruginea Germ.* [*tripia Say.*] A.O., B.C.  
*Cryptocephalus 4-maculatus Say.* C.C.  
*Adoxus obscurus Linn.* [*vitis Fab.*] A.O., B.C., N.C., O.K., N.  
*Chrysochus auratus Fab.* A.O., S.M.  
*Graphops marcassita Cr.* S.M.  
*Entomoscelis adonidis Fab.* B.C.  
*Prasocuris Phelandrii Linn* [*Helodes trivitta Say.*] L'O.  
*varipes Lec.* S.M.  
*Doryphora clivicollis Kirby* [*Chrysomela trimaculata Fab.*] L'O.  
*ro-lineata Say.* S.M.  
*Chrysomela scalaris Lec.* A.O., St.L.  
*philadelphica Linn.* S.M., T.L.

- var. spirææ Say.* A.O., N.C.  
*multipunctata Say, race verrucosa Suffr.* B.C.  
*Plagiodera oviformis Lec.* B.C.  
*Gastroidea polygoni Linn* [Gastrophysa]. W.  
*cyanea Melsh* [Gastrophysa] W., N.  
*Lina lapponica Linn* [Plagiodera interrupta *Fab.*]. A.O., B.C., C.I.,  
O.K., C.R., *var.*  
*scripta Fab.* O.K.  
*Gonioctena arctica Mann.* N.C.  
*pallida Linn* [rufipes *DeG.*]. B.C., Y.F., N.O., O., N.  
*Phyllosecta vitellinæ Linn.* A.O.  
*Phyllobrotica decorata Say.* A.O.  
*Galeruca sagittariæ Gyll.* A.O., B.C. ? *var.*, N.O., C.L., H.M.,  
O.K., O., N., C.C.  
*Hypolampsis pilosa Ill.* C.L.  
*Oedionychis lugens Lec.* B.C.  
*scripta* [? misprint for *scripticollis Say = var vians Ill.*]. C.I.  
*Disonychia collaris Fab.* [Haltica]. L'O.  
*Haltica bimarginata Say* [Graptodera]. B.C., N.C., N.O., M.F.  
*evicta Lec.* [Graptodera]. B.C.  
*Crepidodera mancula Lec.* B.C.  
*Systema frontalis Fab.* A.O.  
*Chelymormpha argus Licht.* [cribraria *Fab.*]. L'O., W.

## TENEBRIONIDÆ.

- Phellopsis porcata Lec.* B.C.  
*Coniontis ovata* [? misprint for *ovalis Esch.*]. B.C.  
*Eleodes cordata Esch.* B.C.  
*Nyctobates pennsylvanicus DeG.* (Ipthimus). L'O.  
*Ipthimus opacus Lec.* S.M.  
*Upis ceramboides Linn.* (*reticulatus Say*). A.O., St.L., B.C., C.L.,  
S.M., O.K., O., N., C.C., R.A.  
*Tenebrio molitor Linn.* L'O., N.O., W., S.M.  
*tenebriodes Beauv.* S.M.  
*Blapstinus moestus Melsh.* S.M., H.M.  
*interruptus Say.* S.M.  
*Hypophlœus punctatus* [misprint ?]. B.C.  
*Boletotherus bifurcus Fab.* (*Bolitophagus cornutus Pz.*). A.O.

## CISTELIDÆ.

*Isomira quadristriata* *Coup.* S.M.

*Hymenorus pilosus* *Melsh.* S.M.

## LAGRIIDÆ.

*Arthromacra ænea* *Say.* S.M.

## MELANDRYIDÆ.

*Penthe obliquata* *Fab.* M.F.

*Serropalpus barbatus* *Schall.* [substriatus *Hd.*]. St.L., O.

*Stenotrachelus arctatus* *Say.* N.C., M.F., O.

## PYTHIDÆ.

*Crymodes discicollis* *Lec.* B.C.

## CEPHALOIDÆ.

*Cephaloon tenuicorne* *Lec.* B.C.

## MORDELLIDÆ.

*Mordellistena vitis* [? misprint for *vilis* *Lec.*]. B.C.

*nigricans* *Melsh.* A.O.

## ANTHICIDÆ.

*Corphyra lugubris* *Say.* S.M.

*collaris* *Say.* (*Pedilus*). A.O.

## MELOIDÆ.

*Meloe angusticollis* *Say* (*rugipennis* *Lec.*). A.O., St.L., N.

*americanus* *Leach.* N.C.

*Macrobasis unicolor* *Kirby.* S.M., O.K.

*Cantharis cyanipennis* *Say.* B.C.

## OTIORHYNCHIDÆ.

*Evotus naso* *Lec.* B.C.

## CURCULIONIDÆ.

*Sitones flavescens* *Marsh.* (*lepidus* *Gyll.*). A.O.

*Trichalophus alternatus* *Say.* B.C.

*Lepyryus gemellus* *Kirby.* N.

*colon* *Linn.* B.C., N.G.

- Pissodes strobi* *Peck.* H.M.  
     *costatus* *Mann.* B.C.  
     *dubius* *Rand.* H.M.  
*Hylobius pales* *Hbst.* A.O., S.M., O., C.R.  
     *confusus* *Kirby.* S.M.  
*Hypomolyx pineti* *Fab.* [*pinicola* *Coup.*]. A.O. (near *pineti*), O., N.,  
     C.R.  
*Lixus caudifer* *Lec.* B.C.  
*Dorytomus laticollis* *Lec.* B.C.  
*Acalyptus carpini* *Hbst.* Y.F.  
*Baris confinis* *Lec.* S.M.

## CALANDRIDÆ.

- Dryophthorus corticalis* *Say.* S.M.

## SCOLYTIDÆ.

- Xyloterus bivittatus* *Kirby.* T.L.  
*Dryocetes septentrionis* *Mann.* B.C.  
*Dendroctonus rufipennis* *Kirby* [*obesus* *Mann.*]. B.C.

## ANTHRIBIDÆ.

- Gonotropis gibbosus* *Lec.* C.C.  
 Report of Progress, 1882-83-84, p. 62d.  
     List of Coleoptera collected by J. R. Spencer, at Fort Churchill,  
     (determined by Mr. J. B. Smith for Mr. James Fletcher, 14 species).  
*Carabus chamissonis* *Fisch.*, var. *baccivorus* *Fisch.*  
*Pterostichus hudsonicus* *Lec.*  
*Amara hyperborea* *Dej.*  
     *similis* *Kirby.*  
*Agabus* [*Gaurodytes*] *griseipennis* *Lec.*?  
*Colymbites sculptilis* *Harr.*  
*Dytiscus dauricus* *Gehl.* [*confluens* *Lec.*].  
*Cryptohypnus abbreviatus* *Say.*  
*Criocephalus obsoletus* *Rand.*  
*Neoclytus conjunctus* *Lec.*  
*Pachyta liturata* *Kirby.*  
*Acmaeops proteus* *Kirby.*  
 Two species unknown to Mr. Smith.

Annual Report (new series), Vol. I., 1885, p. 26dd.

List of Coleoptera collected in 1885, by Dr. Robert Bell, in connection with the Hudson's Bay expedition, (determined by Dr. G. H. Horn for Mr. W. H. Harrington, 10 species).

*Stupart's Bay.*

*Amara hypoborea Dej.* Over 100 specimens.

*Pterostichus hudsonicus Lec.*

*Hydroporus longicornis Sharp.* Occurs in Europe.  
*perplexus Sharp.*

*Agabus dissimilis Sahlb.* [*longulus Lec. ?*]. Fifty specimens.

After the list was printed, Dr. Horn sent specimens of this species, which he had referred with doubt to *longulus Lec.*, to Dr. Sharp, who determined them to belong to *dissimilis Sahlb.*

*Cape Chudleigh.*

*Nebria Sahlbergi Fisch.*

*Amara hyperborea Dej.*

*Lepyrus colon Linn.*

*Cape Digges.*

*Amara hyperborea Dej.*

*Agabus dissimilis Sahlb.* [*longulus Lec. ?*].

*Criocephalus agrestis Kirby.*

*Blanc Sablon.*

*Nebria Sahlbergi Fisch.*

*Pterostichus Luczotii Dej.*

*Quedius sublimbatus Mäkl.*

Annual Report (new series), Vol. III., p. 75j.

List of Coleptera taken on the South Coast and Islands of James Bay, by Mr. J. M. Macoun, in 1887, (determined by Mr. James Fletcher, Dominion Entomologist, 21 species).

*Cicindela 12-guttata Dej.*

*Calosoma frigidum Kirby.*

*Chlænus sericeus Forst.*

*Silpha lapponica Hbst.*

*Buprestis maculiventris Say.*

*Asemum moestum Hald.*

*Criocephalus obsoletus Rand.*

*Xylotrechus undulatus Say.*

*Rhagium lineatum Oliv.*  
*Pachyta liturata Kirby.*  
*Acmaeops proteus Kirby.*  
*Leptura chrysocoma Kirby.*  
*Monohammus scutellatus Say.*  
*Orsodacna atra Ahr.*  
*Adoxus obscurus Linn. [vitis Fab.].*  
*Lina lapponica Linn.*  
*Gonioctena pallida Linn.*  
*Upis ceramboides Linn.*  
*Lepyrus colon Linn.*

P.S.—Line 18, page 155, should read *longulus Lec. [Gaurodytes]*.  
Y.F.

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#### BOOK NOTICE.

THE PHYCITIDÆ OF NORTH AMERICA, BY GEO. D. HULST.

This valuable paper forms number 2, volume 17, of the Transactions of the American Entomological Society. The author not only gives us what has been done on this family by others, but also the results of his own critical and long continued study and investigation.

He complains of difficulties in the study of these insects owing to the fact that so many of the types are in European museums, and further, that so many are in private collections. There may be some question whether this last is not an advantage, for, as a rule, private collections are more easily accessible than public ones, and the visitor is not hampered by stringent rules. There is but little use to attempt the study of microlepidoptera in a museum where the rules forbid the removal of an insect from the trays, as is the case in many.

The Phycitidæ are given family rank "in the super-family Pyralidæ," and after the family characters, the literature of the subject is quite fully and very fairly given, which is always a difficult task. Mr. Hulst divides the family into two sub-families, based on the presence or absence of the lower anal plate, and differs from Ragonot, who divides them on the development of the tongue. From my own studies I am inclined to agree with Mr. Hulst.

The structure of the imago is treated thoroughly and exhaustively.

This part of the work is a model worthy of imitation by other systematic writers. When all our insects have been studied in this careful manner and then monographed, we shall have a sound basis for further work.

A vast field is open for future investigation on the early stages of these insects, and undoubtedly our economic entomologists will, in time, give us much valuable information in this direction now that the way is made clear.

The author states that he "takes little interest, comparatively, in the guesses which are made of the ancestry of any group of the Lepidoptera." I am greatly surprised that he should decline to enter upon this fashionable field of conjecture. A person may as well be out of the world as out of fashion!

There are given synopses of the sub-families and of the genera, and under each genus is a synopsis of the species. A valuable feature is the giving of the type under each genus and the full synonymy. A list of undetermined species is also given with the original descriptions. Seven of these are Walker's species and the remaining three were published by Clemens. It would have been a great satisfaction if Mr. Hulst had given us the correct pronunciation of the generic names, especially those of Indian origin, for some of us may forget our Latin so far as to pronounce some of them incorrectly.

Under Notes on other Species, p. 221, by a slip it is stated that *Nephopteryx intractella* Walk. is a synonym of *Blepharomastix ranalis* which is itself a synonym of *Botis similalis* Guen. As the information went from me, and I may have made the slip myself in writing, I take this occasion to correct and say that *Nephopteryx intractella* Walk. is a synonym of *Nymphula similalis* Guen., and is given in Grote's Check-List under the name of *Eurycreon rantalis* Guen. See Ent. Am., Vol. 5, p. 211.

At the end is given a catalogue of the Phycitidæ of North America, comprising 71 genera and 201 species, followed by three plates of structural details.

On the whole this is one of the most satisfactory papers on the micro-lepidoptera I have ever seen, and it is "devoutly to be wished" that Mr. Hulst will immediately take up the *Geometridæ* and treat them in as thorough and complete a manner as he has the *Phycitidæ*.

C. N. FERNALD.

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Mailed September 11th.

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# THE CANADIAN ENTOMOLOGIST.

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*Entomol. Department*

No. 10.

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EDITED BY

REV. C. J. S. BETHUNE.

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# The Canadian Entomologist.

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LONDON, OCTOBER, 1890.

No. 10.

## PROCEEDINGS OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Club assembled in the State House at Indianapolis, Ind., on Wednesday, August 20th, 1890, and began its regular sessions at 9 o'clock a. m., the President, Prof. A. J. Cook, Agricultural College, Mich., in the chair.

There were present during the meetings :—W. B. Alwood, Blacksburg, Va. ; Geo. F. Atkinson, Columbia, S. C. ; W. S. Blachley ; P. Carter ; Prof. E. W. Claypole and K. B. Claypole, Akron, Ohio ; F. S. Earle, Ocean Springs, Mich. ; S. G. Evans, Evansville, Ind. ; James Fletcher, Ottawa, Ont. ; H. Garman, Lexington, Ky. ; Mrs. O. Hanney ; C. W. Hargitt, Oxford, Ohio ; Thos. Hunt ; John Marten, Albion, Ill. ; Miss Mary E. Murtfeldt and Miss Augusta Murtfeldt, St. Louis, Mo. ; W. W. Norman ; Prof. Herbert Osborn and L. H. Pammel, Ames, Iowa ; R. S. F. Perry ; C. Robertson, Carlingville, Ind. ; Prof. J. W. Spencer, Athens, Ga. ; James Troop and Prof. F. M. Webster, Lafayette, Ind. ; Dr. Clarence M. Weed, Columbus, Ohio, and others.

The President, Prof. A. J. Cook, delivered the following address :—  
ON TEACHING ENTOMOLOGY.

LADIES AND GENTLEMEN OF THE ENTOMOLOGICAL CLUB,—I congratulate you that another year has passed, and our number has not been broken in upon by death. While our ranks have been much enlarged, no one has been called to that undiscovered country from whose bourne no traveller returns. I also congratulate you upon the great increment in our force of working entomologists. I think I may say, with no fear of contradiction, that no year in the history of America has been so remarkable in this respect as has the last. This is a cause for special felicitation, not only to entomologists, but to all our people. Ours is a tremendous country—by ours I include, of course, our Canadian brothers, for we, as scientists, know no line of separation—and to spy out the entire land needs an army of workers or observers, all trained to keen sight and

ready apprehension. But more than this the magnitude of our country is fully equalled by the magnitude of the insect hosts, and to know all of these, with their full life history, requires an incalculable amount of closest research. But our business economy demands this for all our species : for so wonderful is the balance of nature, so close the relations of all species of life, that really we may hardly divide insects into those important and those unimportant in our agricultural economy. All are important ; and so from an economic, no less than a scientific standpoint, it is desirable that all such research be widely encouraged, and it is a most hopeful omen—the rapid increase of earnest and trained workers. I shall not in this address occupy time by giving the peculiarities of the season in respect to insects, nor yet call attention to interesting discoveries, like the importation of the *Vedalia cardinalis*. All these will be brought out in papers and discussions. I must, however, refer to the new association for the advancement of economic entomology, which was organized at Toronto a year ago, and which held its first meeting at Washington last November. This meeting, under the Presidency of Dr. Riley, was a valuable one ; and that society promises much for the science of entomology, as well as for its economic development. It is also a matter of much interest that a new paper—"Insect News"—is started at that great centre of entomology—Philadelphia—which will also do much every way for our science. This, with the very excellent periodical "Insect Life," published by the Entomological Division of the Department of Agriculture, can but give new impetus to entomological research. In addition to these, we have an addition to Prof. Comstock's admirable work, which, when completed, will form a most valuable adjunct in the development of entomology. If we may judge from what we already have, this will be invaluable in every entomological laboratory. When the Society of Economic Entomologists was organized a year ago it was remarked by one of our first entomologists that that move sounded the death-knell of this Club. I then remarked that such ought not to be the case. That Society is to be composed only of those interested in economic entomology, and of course will only put emphasis in the direction of the practical aspects of the science ; this more or less of entomologists in a wider sense, and so will include those interested in practical entomology and also in the science without relation to utility. The Club then may well continue. I believe it will live and thrive, and

will be most helpful to entomologists and to our science. While the other Association will discuss economic questions, this Club will place no limit on either its discussions or its membership, only so far as entomology shall be its aim and purpose. No one doubts but that he who has a thorough training in the science of entomology will be far better prepared for practical work, and so there can be only the most cordial relation between the Association of Economic Entomologists and this Club. Indeed, many of our most active entomologists will be members of both. I have already stated the truism that only can he do the best practical work in entomology who is thoroughly well grounded in the general science of entomology. As we now have a great call for entomologists in our experimental stations, agricultural colleges, and as State entomologists, not to speak of the fact that every farmer and fruit-grower would be more successful if he were well informed in this science, it goes without saying that there ought to be in training men for just such work. It seems to me that it needs no argument to show that our agricultural colleges are just the places where this training should be given. They were founded to teach those subjects which would be most serviceable on the farm. Entomology is one of the chief of these. Thus it follows that every student of agriculture should have a thorough course in this science, with the practical aspect of the subject kept in the foreground. In thus presenting this science to large classes—I have from thirty to forty each year who study this subject in the course—the teacher will find some in each class who are specially fitted to succeed. They enjoy the study and work most earnestly just for the love of the pursuit. They have quick observation, and are very accurate and honest in all their work. It needs no prophet to bespeak success in this field for such students. Our agricultural colleges are just the places to discover the men who have great possibilities in this direction; just the places to give the training that shall best fit men to do the most valuable work. It will be my purpose in the remainder of this address to describe the equipment for such work, and to explain the method which I believe will give the best results. Of first importance is a good library; this should contain all the standard works, periodicals and monographs, so that students who may decide to study any insect or genus, may find what has been written on the subject. Of course this cannot be had at once, but it is so essential

that no effort should be spared to build up a complete entomological library at the earliest possible moment. *True*, the scientist should study *things*, not books, but he will find a wide use of books most helpful in his study. Next to a library, such colleges should have good collections, which are often of more value than the library. A small show collection, illustrating the families and orders, and the several stages of the most injurious species of the place as well as the groups of beneficial ones should be open to the public. This will be studied and appreciated by the practical farmer, who, as he visits the college, will find it helpful, and will also interest and stimulate the under-class men, who will thus have their attention called towards insects before they commence the regular study, which will not occur till they are well along in the course. Drawing, botany, microscopy, and French and German, if thoroughly understood, will be great aids to the student who commences the study of entomology. Thus this study will come late in the course and the show collection will be whetting the appetite of the under-class men from the time they enter college until they commence the study. I would also have what I call a student collection—this is a pretty full collection from the locality of the college. This I would hang upon the wall of the lecture room, which I would have dark, except when in use, so as to preserve the colour of the specimens. I would have this in rather small cases, with glass in front and also back where it is desirable, as in case of Diurnals, to study both under and upper sides of the wings. This collection should show at least types of each group in all stages, from egg to imago, as well as nests, cocoons, etc. This is an object lesson ever before the student, is ever ready for use by the teacher to illustrate his lecture, and is at the disposal of the students in naming their own collections or in closer study of any group. It seems to me such a collection should be in every college. Lastly, I would have a laboratory collection which should be a biological collection, and the fuller the better. This is in large, tight, glass-faced drawers. I use the Harvard case. This is for the use of teachers and post-graduates who desire to study further in the science. It is too valuable for general use by the student or to be kept to satisfy general curiosity.

#### "THE COURSE OF STUDY."

As I have before remarked, before the student commences the study of insects he should have had a good course in free-hand drawing, should

have had instruction in the use of the microscope and in preparing microscopic specimens and slides, and if he has a ready use of German and French it will be very helpful to him in his study. It is also desirable that the student should have had a full course in botany. The students of our college have had three terms of botany, one devoted entirely to microscopic botany, before they begin the study of entomology. I consider this very valuable preparatory work. Entomology is very close precise work, and the laboratory work if carried on for a less space than three hours at a time is not satisfactory. But three hours of such close work is very wearying unless the student has had a fitting preparation. Thus I am pleased that our students have had *vertebrate dissection* with human and comparative anatomy and physiology before they commence entomology. I know this seems the reverse of the natural method ; as nature proceeds from lower to higher ; vertebrate dissection is lighter and less trying to eye and brain than is the study of insect anatomy ; thus I am pleased to have Anatomy and Physiology of Vertebrates precede that of the Arthropoda in our course. In our College the student attends a course of sixty lectures on the anatomy and physiology of insects, systematic entomology and the economic bearing of the subject. These lectures are illustrated by use of models, the student's collection of insects, already referred to, by microscopic preparations, mostly prepared at the College, and elaborate charts and drawings also prepared specially for our use. In connection with this course there are 36 hours of laboratory. Each student works three hours one day each week for twelve weeks. In this time they are able to study the internal anatomy, and to examine carefully and accurately one insect of each order. In connection with this several insects are traced to the genus by such keys as Leconte and Horn, Cresson, Williston, etc. Besides the above, each student makes a collection of from ten to twenty-five insects of each order, all neatly put up with date and locality label ; each order by itself and all labelled as far as time will permit. Many students succeed in naming a large number of their specimens. Each student is also required to mount insects in all the approved ways. Small insects mounted on triangular pieces of cardboard or rectangles of cork with silver wires, while the larvæ are put in bottles of alcohol with rubber corks and also prepared by eviscerating and drying, while distended with air, in a heated oven. The students are also encouraged to prepare biological collections, in

which they preserve the eggs, larvæ after each moult, pupa, cocoon, imago of both sexes, and of various sizes and the several variations. Some of our most enthusiastic students work out several such life histories, describing not only the separate stages, but the several parasites that work to destroy the insects. I regard this work as very valuable. It is excellent discipline for the mind and observation, gives accurate information of the most interesting kind, and arouses enthusiasm for the study as nothing else can. It is such work as this that will tell for the future of entomological research, that will make entomologists, who will honour alike the fields of pure and applied entomology. But such study ought not and will not stop here. Post-graduates will avail themselves of the opportunities which such laboratories offer. Last winter during our long vacation—ours is an agricultural college and our vacations must needs occur in winter, when farm operations are largely at a standstill—I had ten special students of entomology in my laboratory, one from South Dakota, one from Indiana, one from Ohio, one from Japan, one from Wisconsin, and the others from our own State. Nearly all were college graduates. Six special students, all graduates from colleges, have spent the year in my laboratory in special entomological study as post-graduate students. It seems to me that such are the young men who are going to develop the entomology of our country. They are the young men who can and will do grand work in our colleges and experimental stations. These young men each take up some special family or genus of insects, to which they give the major part of their time and study. They collect in all orders and give special attention to biological work, tracing the life histories of insects, identifying as far as possible the insects they capture and try to become familiar with entomological literature, so far as they are able. The students are mutually helpful to each other. As the laboratory may be said to be a sort of perpetual Natural History, or more accurately Entomological Society, thus the students become familiar with the general laboratory work, in fact, they each become a factor in some degree of carrying the work forward. Here I will close by explaining briefly the mode of our laboratory work, which differs in some degree from the admirable plan which Prof. Forbes explained at the Washington meeting of Economic Entomologists last November. Our labels give in compact space locality, date, accession and species number. The accession number agrees with a number—serial number—in our accession catalogue for the special year. Thus, ac. 400 shows that the insect or

insects bearing that label were the 400th collected during that season. The sp. number is given as the insect is determined, and is the number of the insect in the catalogue which we use. Thus, sp. 25 is "*Cicindela purpurea*," as the beetle is numbered 25 in Henshaw's catalogue of Coleoptera. In case the catalogue is not numbered, as is the case with Cresson's list of Hymenoptera, then we number it. We have a column in our accession catalogue for date, collector, person who named the specimen, and also for remarks. This last column is wide, and in it we can usually write all necessary information which we received in the collecting. If we are experimenting with or studying the insect, our notes are kept on cards. These are numbered to agree with accession catalogue, and are kept in serial order until we know the species when we add the species number as well. We now index the card and place it in its correct alphabetical position in our card collections. Thus we can very easily find our notes on any specimen, either by accession number or by the name of the species. This plan works well, and, it seems to me, is very economical in respect to time. Of course our students all see this scheme and become familiar with its workings.

Dr. C. M. Weed had listened with much pleasure to the President's address and approved of most of the points brought forward. He considered a knowledge of French and German of the utmost importance from the frequent necessity of consulting works in those languages when working up the life-histories of insects. He did not, however, like the label submitted by Prof. Cook, thinking that it entailed too great an expenditure of time. He had adopted Prof. Forbes's system of labelling, and had found that it answered all purposes.

Prof. Herbert Osborn approved very highly of the course of instruction in entomology outlined in the address.

Dr. C. M. Weed then read a paper upon the life-history of the evening primrose curculio (*Tyloderma foveolatum*) which he had bred from the stems both of *Oenothera* and *Epilobium* in large numbers.

Prof. F. M. Webster had listened to the paper with much interest; as stated by Dr. Weed he had given some study to the insect in question, and was pleased to hear these further observations. He had found that when a plant was infested the beetle occurred in all its stages, and that those near the base were always further advanced towards maturity.

The meeting adjourned.

(To be continued.)

ON THE FOOD-HABITS OF NORTH AMERICAN  
RHYNCHOPHORA.

BY WM. BEUTENMULLER, NEW YORK.

In the present paper I have attempted to bring together all the Food-Habits of North American Rhynchophora (except the Scolytidæ) that have been placed on record in the various entomological publications, with the addition of my personal observations on the subject.

*Eugnamptus collaris* and *E. angustatus* I have found plentifully upon the foliage of hickory and butternut trees.

*Rhynchites bicolor* may be found on various species of wild roses.

*Pterocolus ovatus* I have beaten from live oak trees at Kissimmee, Florida, May, 1887.

*Attelabus bipustulatus* lives on oak, rolling up the leaves (Murtfeldt, CAN. ENT., IV., p. 143). *A. analis* and *A. nigripes* also live on oak. The latter species I have beaten from live oak at Kissimmee, Florida, in April.

*Graphorhinus vadosus* feeds in the imago state on the leaves of clover, according to Mr. F. M. Webster (Am. Nat., 16, p. 746).

*Epicærus imbricatus*, according to Dr. C. V. Riley, is injurious to apple and cherry trees and gooseberry bushes, by gnawing the twigs and fruits; also said to be found on onions, radishes, cabbage, beans, watermelons, cucumbers, beets, squashes and potato, etc.

*Exomias pellucidus*. I have first taken this European beetle at Astoria, L. I., in the year 1884, and again on Staten Island in 1886. In Europe it lives on the strawberry. The food plant in this country has not yet been detected. (See Ent. Am., III., p. 188.)

*Ophryastes vittatus* is chiefly found on "greasewood," as is also *O. sulcirostris* and *O. latirostris*, according to Mr. Wickham (Ent. Am., V., p. 77).

*Pancopus erinaceus* occurs on wild grape. (Schwarz, Bull. Bklyn. Ent. Soc., VII., p. 84.)

*Diaminus subsericeus* was taken around the roots of cottonwood by Mr. Wickham (l. c., p. 78).

*Otiorhynchus sulcatus*. This European species is destructive to a variety of horticultural plants. In the larval stage it attacks the strawberry, devouring the roots. *O. ovatus* also infests the roots of this plant.

*Aragnomus griseus* was recorded by Dr. C. V. Riley as an enemy to pear trees in Oregon. (Insect Life, Vol. I., p. 16.)

*Pachnaus opalus* is injurious to the orange in Florida. *P. distans* feeds on oak. (Riley, Am. Nat., 16, p. 916.)

*Tanymecus confertus* appears to be polyphagous, without preference for any particular plant. (Riley, l. c.)

*Anametis grisea* in the larval stage lives under the bark of apple and pear. (Riley, l. c.)

*Pandeletejus hilaris* lives in the trunk of the white oak. (Harris, Inj. Ins., p. 70), also found on beech trees by Mr. F. M. Chittenden.

*Brachystylus acutus* is only found on the persimmon. (Riley, l. c.)

*Neoptochus adspersus* feeds on oak. (Riley, l. c.)

*Artipus floridanus* is injurious to the orange. (Riley, l. c.)

*Aramigus tessellatus*, according to Mr. E. A. Popenoe, infests the sweet potato. (Industrialist, May 29th, 1886.)

*Aramigus Fulleri* feeds on the roots of roses. (Riley, Rep. Dept. Agricul., 1878.)

*Aphrastus taniatus* lives on the paw-paw. (Riley, l. c.)

*Scythropus elegans* is found on the pine, according to Mr. W. H. Harrington. (Trans. Ottawa Field Nat. Club, Vol. I., No. 2, p. 33, 1881.) Mr. F. H. Chittenden also found the insect in abundance on pine (*P. strobus*) at Ithaca, N. Y.

*Eudiagogus pulcher* and *E. Rosenschældi* both feed on *Cassia occidentalis* and *C. obtusifolia*. The former species I have found in large numbers at Enterprise, Fla., in May.

*Sitones lineellus* and *S. flavescens* are injurious to the clover and lucerne in Europe. *S. hispidulus* also lives on the roots of clover.

*Plinthodes taniatus* I have beaten from small alder bushes in the Orange Mts., New Jersey. Whether the species lives on this plant I am unable to say.

*Ithycerus noveboracensis* is found on white and burr oaks. The larva bores in the tender twigs. I have also found the insect on hickory. Mr. W. H. Harrington found it on beech trees. (Rep. Ent. Soc. Ont., p. 52, 1880.)

*Apion herculanum* occurs on the flowers of *Viburnum acerifolia*, according to Dr. Hamilton. (CAN. ENT., 20, p. 67).

*Apion rostrum* infests the seed pods of wild indigo (*Baptisia tinctoria*).

*Apion nigrum* sometimes depredates the leaves of locust (*Robinia pseudacacia*). *A. fraternum* was observed upon two species of *Lespedeza* by Mr. F. H. Chittenden. *A. signipes* was obtained from the seeds of a species of *Astragalus* by Say. (Le Conte, Ed., p. 265.)

*Podapion gallicola* makes a spherical or ovoid gall on pine (*Pinus inops*), Riley. (Bull. Bklyn. Ent. Soc., VI., p. 61.) I have also found the galls in the vicinity of Washington, D. C., last June.

*Phytonomus punctatus* lives on the leaves of clover. I have found it in abundance on timothy grass this season. *P. nigrirostris* also feeds on clover and *Bupththalmum Salicifolium*. *P. comptus* lives on *Polygonum*, and *P. eximius* on *Rumex*. (Riley, Rep. Dept. Agric., 1881-82, p. 171.)

*Listronotus latiusculus* was found by Mr. C. M. Weed in all stages in the stalks of *Sagittaria variabilis*. Mr. F. M. Chittenden found *L. tuberosus*, *L. caudatus* and *L. appendiculatus* while sweeping a small patch of aquatic plants composed entirely of *Sagittaria* and a species of *Carex*. *L. appendiculatus*, it is said, was found by Mr. William Julich breeding in the lower parts of the stems of some species of reed. I have also taken two species of *Listronotus* on the flower heads of *Sagittaria* at Shingle Creek, Kissimmee, Florida, April.

*Pissodes strobi* is sometimes very destructive to the white pine. The larva and imago were first figured by Peck, in 1817. (Mass. Agric. Reposit., IV., pp. 205, 211, pl. 1.) *P. affinis* is also found on the pine.

*Pachylobius picivorus* is placed by Mr. W. H. Harrington in a list of insects found on pine (Trans. Ottawa Field Nat. Club, I., p. 33).

*Hylobius pales* lives in pine trees beneath the bark, burrowing into and destroying the inner surface of the bark, and the tender newly formed wood, often doing great damage to pine forests.

*Lixus rubellus* has been observed in considerable numbers clinging to the leaves and blossoms of *Polygonum amphibium*. (Webster, l. c.)

*Lixus parvus* is said by Dr. Riley to form galls in the stems of *Amelanchier*. (Proc. Ent. Soc., Wash., I., p. 33.)

*Lixus concavus*. Glover has observed this insect burrowing in the foot stalks of rhubarb or pie plant. (Rep. Com. Agri., p. 90, 1865.) I have also found it on a species of *Rumex*, and also producing a gall in the stalk of the thistle, from which I raised the species. Mr. Webster also bred it from wild sunflowers. (Ent. Am., V., p. 11.)

*Lixus macer*. Dr. Riley reared this species from *Chenopodium*

*hybridum*. Coquillett observed it ovipositing in wild sunflower, as also did Mr. Webster. (Ent. Am., V., p. 11.)

*Barytychins discoideus* breeds in the flower heads of *Helenium tenuifolium*. (Schwarz, l. c.)

*B. amarus* was found on ragweed by Dr. Hamilton. (CAN. ENT., 18, p. 114.)

*Smicronyx griseus* and *S. tychoides* occur on ragweed (*Ambrosia*), according to Dr. Hamilton (l. c.)

*Anchodemus angustus* has been found by Mr. Harrington eating the leaves of a species of *Sagittaria*. (CAN. ENT., 16, p. 118.)

*Strophosomus coryli* has been found by Mr. Bailey on sweet birch (*Betula lenta*), Jülich (Ent. Am., V., p. 56). In Europe, the species lives on oak, beech, pine and hazel.

*Lissorhoptrus simplex* lives on the roots of rice. (Riley, Rep. Dept. Agricul., p. 130, 1881-82.)

*Magdalis barbata* has been found ovipositing in fallen hickory (*Carya amara*), by Mr. Harrington. (Ent. Am., I., p. 18.)

*Magdalis olya* burrows under the bark of oak. *M. armicollis* inhabits the elm.

*Magdalis alutacea* probably bores in the terminal twigs of *Pinus inops*. (Riley, Bull. Bklyn. Ent. Soc., VI., p. 62.)

*Coccotorus scutellaris* attacks the fruit of the plum.

*Anthonomus quadrigibbus* punctures the fruit of the apple and pear. The larva lives in the heart of the fruit, and feeds around the core.

*Anthonomus suturalis* attacks the cranberry, laying its eggs in the bud, and the larva living inside the fruit.

*Anthonomus sycophanta* was bred from the galls of a sawfly on willow.

*Anthonomus musculus* is very destructive to the strawberry.

*Anthonomus pusillus* lives in the seed pods of the frost weed (*Helianthemum canadense*). Blanchard (Ent. Am., III., p. 87).

*Anthonomus gularis* oviposits in the flowers of *Cassia marylandica*. (Schwarz, l. c.) *Anthonomus flavicornis* was found by Mr. Schwarz, inquiline in a globular acarid gall on the leaves of *Solanum eleagnifolia*.

*Otidoccephalus chevrolatii* occurs on elm and hickory, according to Mr. W. H. Harrington. (CAN. ENT., 16, p. 118.) *O. laevicollis* was hatched by Dr C. V. Riley from the galls of a species of *Cynips* on oak.

*Elleschus ephippiatus*. I have taken this species in abundance on willow (*Salix fragilis*).

(To be continued.)

# PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 180, Volume xxii.)

## Genus HALISIDOTA Hübner.

1816—Hübner, Verzeichniss, 170.

1855—Wlk., C. B. Mus., Lep. Het., III., 732.

1862—Morris, Synopsis, 347.

1873—Stretch, Zyg. & Bomb., 87, fig. venation.

Head rather well developed; palpi exceeding front; tongue moderate, but somewhat variable in the species. Antennæ of ♂ long, lengthily bipectinated to the tip, a single branch to each side of each joint. Legs short and stout, posterior longest and weakest; spurs normal, but short; claws of tarsi simple.

Primaries with v 10 out of the subcostal before the end of the cell; 7-9 on a stalk from the same point with 6; 8 and 9 branching just before the tip; 4 and 5 from the same point at the end of the median; 3 from the median some distance before the end of the cell.

Secondaries with 8 from about the middle of subcostal and very short; 6 and 7 from the same point at end of the subcostal; 4 and 5 together from the end of the median; 3 from the median before the end of the cell.

*H. carya* served as the subject on which the above studies were made. It is not improbable that there may be some difference in details of structure in the species. Many of the described forms I have seen but casually, and of a few I have seen large series. This is, in my opinion, the most difficult genus in the *Arctiida*. There is a *phytophagic* variation in the larva, and the larvæ are not all of the same type. From the material in the National Museum collection it would seem, too, that larvæ widely different in type, not color merely, produce insects that are superficially almost indistinguishable. The synonymy is involved, and I give it exactly as I have found it.

*H. agassizii* Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 128, *Halisidota*.

1873—Stretch\*, Zyg. & Bomb., 87, 102, pl. IV., ff. 8 and 9, and pl. X., f. 7, *Halisidota*.

1873—Edw., Proc. Cal. Ac. Sci., V., 187, *Halisidota*.

var. *alni* Hy. Edw.

1875—Edw.\*, Proc. Cal. Ac. Sci., VII., 129, *Halisidota*.

Habitat—California.

Food plant—Willow, Alder.

*H. ambigua* Strk.

1878—Strk., Proc. Dav. Ac. Sci., II., 272, pl. IX, f. 7, ♂, *Halisidota bolteri* Hy. Edw.

1884—Edw., Papilio, IV., 121, *Scirartia*.

1888—Edw., Ent. Amer., III., 182, *pr. syn.*

Habitat—Colorado, New Mexico.

*H. argentata* Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 129, *Halisidota*.

1873—Stretch\*, Zyg. & Bomb., 87, pl. 6, f. 12, ♀, *Halisidota*.

1873—Edw., Proc. Cal. Ac. Sci., V., 187, 369, *Halisidota*.

Habitat—California, Vancouver.

Food plants—*Pinus ponderosa* and *P. lambertiana*.

*H. californica* Wlk.

1865—Wlk., C. B. Mus., Lep. Het., XXXI., 311, *Halisidota*.

1873—Stretch, Zyg. & Bomb., 102, = *agassizii*.

*angulifera* Wlk.

1866—Wlk., Lords Trav. in Vanc. App., 335, *Halisidota*.

1873—Stretch, Zyg. & Bomb., 102, = *agassizii*.

*salicis* Bdv.

1868—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 81, *Phagoptera*.

1869—Grt. & Rob., Tr. Am. Ent. Soc., III., 175, *pr. syn.*

Habitat—British Columbia, Vancouver, California.

Mr. Grote, in his list of 1882, does not follow Stretch in his reference of this species to *agassizii*, but in a note, p. 63, suggests that *californica*, *agassizii* and *argentata* may be the same species.

*H. carya* Harr.

1841—Harris\*, Rept., Ins. Mass., 258, *Lophocampa*.

1855—Fitch\*, 1st Rept., Ins. N. Y., 159, *Halisidota*.

1860—Clem., Proc. Ac. Nat. Sci. Phil., XII., 533, *Halisidota*.

1862—Harris\*, Inj. Insects, 361, pl. vi., ff. 1 and 2, and f. 175,  
*Lophocampa*.

1862—Morris in note to Harris l. c., *Halisdota*.

1862—Morris, Synopsis, 349, *Halisdota*.

1863—Saund., syn. Can. Arct., 20, *Halisdota*.

1872—Pack., 4th Rept. Peab. Ac., 87, *Halisdota*.

1873—Stretch\*, Zyg. and Bomb., 87, 140, pl. VI. f. 11, *Halisdota*.

1874—Lint.\*, Ent. Cont., III., 148, *Halisdota*.

*porphyria* H. Sch.

1855—H. Sch., Lep. Exot. sp. nov. f., 283, *Phæoptera*.

1858—H. Sch., l. c. p. 81, *Halisdota*.

1864—Pack., Proc. Ent., Soc., Phil., III., 128, *pr. syn.*

*annulifascia* Wlk.

1856—Wlk., C. B. Mus., Lep. Het., III., 743, *Halisdota*.

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 533, *Halisdota*.

1862—Morris, synopsis, Suppl., 349, *Halisdota*.

1862—Clem., in Morris Syn., 352, *pr. syn.*

1864—Pack., Proc. Ent. Soc., Phil., III., 128, *pr. syn.*

Habitat—Maine, New York, New Jersey, Mass., Arizona, N. Mexico,  
California, Canada.

Food-plants—Elm, hickory, Ash.

*H. cinctipes* Grt.

1865—Grt., Proc. Ent. Soc., Phil., V., 242, *Halisdota*.

1866—H. Sch., Corr. Blatt, Regensb., XX., 130, *Halisdota*.

188—Gundlach\*, Cont. Ent., Cuba, 269, *Halisdota*.

1884—Hy. Edw., Papilio, IV., 76, *Halisdota*.

*tessellaris*† Wlk.

1856—Wlk., C. B. Mus., Lep. Het., III., 733, *Halisdota*.

1869—Grt. and Rob., Trans. Am. Ent. Soc., II., 72, *pr. syn.*

Habitat—Texas, Florida (?), Mexico, Cuba.

Food-plant—*Hibiscus* (Gundlach).

I have in some way mislaid my original reference to Gundlach's work,  
and do not find the date in the copy.

*H. davisii* Hy. Edw.

1873—Edw., Proc. Cal. Ac. Sci., V., 365, *Halisdota*.

Habitat—Arizona.

*H. edwardsii* Pack.

- 1864—Pack., Proc. Ent. Soc., Phil., III., 129, *Halisidota*.  
1873—Stretch., Zyg. and Bomb., 88, pl. III., f. s, *Halisidota*.  
1875—Edw.\*, Proc. Cal. Ac. Sci., VII., 21—egg and young larva.

*translucida* Wlk.

- 1865—Walk., C. B. Mus., Lep. Het., XXXI., 310, *Halisidota*.  
1868—Grt. and Rob., Trans. Am. Ent. Sci., II., 85, *pr. syn.*

*quercus* Bdv.

- 1868—Bdv., Lep., Cal. (Ann. Soc. Ent., Belg., XII.), 81, *Phagoptera*,  
1869—Grt. and Rob., Trans. Am. Ent. Soc., III., 175, *pr. syn.*

Habitat—California.

*H. ingens* Hy. Edw.

- 1881—Edw., Papilio, I., 39, *Halisidota*.  
Habitat—Arizona.

*H. labecula* Grt.

- 1881—Grt., Papilio, I., 174, *Halisidota*.  
Habitat—New Mexico.

*H. laqueata* Hy. Edw.

- 1886—Edw., Ent. Amer., II., 166, *Halisidota*.  
Habitat—Texas.

*H. maculata* Harr.

- 1841—Harris\*, Rept. Ins., Mass., 259, *Lophocampa*.  
1860—Clem., Proc., Ac. Nat. Sci., XII., 534, *Halisidota*.  
1862—Morris, Synopsis, 349, *Halisidota*.  
1862—Harris\*, Injurious Insects, 363, *Lophocampa*.  
1871—Saund.\*, CAN. ENT., III., 186, *Halisidota*.  
1873—Stretch., Zyg. and Bomb., 87, *Halisidota*.

*fulvoflava* Wlk.

- 1856—Wlk., C. B. Mus., Lep. Het., III., 733, *Halisidota*.  
1858—H. Sch., Lep. Exot., sp. nov., 71, *Phagoptera*.  
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 534, (?) *pr. syn.*  
1862—Morris, Synopsis, App., 349, *Halisidota*.  
1862—Clem., in Morris Syn., 352, (?) *pr. syn.*  
1863—Saund., Syn. Can. Arct., 21, *Halisidota*.

1864—Pack., Proc. Ent. Soc., Phil., III., 128, *pr. syn.*

*guttifera* H. Sch.

1855—H. Sch., Lep. Exot., sp. nov., f. 284, *Phagoptera*.

1858—H. Sch., l. c., p. 71, *pr. syn.*

Habitat—Nova Scotia, Canada, Maine, Massachusetts, New York,  
New Jersey, Illinois, California.

Food Plant—Oak.

*Halisidota megaphyrrha*, Wlk., XXXI., 308, which should come in  
here has been referred to by Messrs. Grote and Robinson as not North  
America.

*H. minima* Neum.

1883—Neum., Papilio, III., 138, *Halisidota*.

Habitat—Arizona.

*H. mixta* Neum.

1882—Neum., Papilio, II., 133, *Halisidota*.

Habitat—Arizona.

(To be continued.)

## ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held in the rooms, Victoria Hall, London, on Wednesday, August 27th. The following officers were elected for the ensuing year :—President, Rev. C. J. S. Bethune, D.C.L., of Port Hope ; Vice-President, Mr. James Fletcher, of Ottawa ; Secretary, Mr. W. E. Saunders, of London ; Treasurer, Mr. J. M. Denton, of London. Directors—Messrs. W. H. Harrington, Ottawa ; J. D. Evans, Sudbury ; Gamble Geddes, Toronto ; A. W. Hanham, Hamilton ; J. A. Moffat, London. Curator and Librarian, Mr. J. A. Moffat, London. Editor of the CANADIAN ENTOMOLOGIST, Rev. C. J. S. Bethune, Port Hope. Editing Committee, Mr. W. E. Saunders, London ; Rev. T. W. Fyles, Quebec ; H. H. Lyman, Montreal. Delegate to the Royal Society of Canada, Rev. T. W. Fyles, Quebec. Auditors, Messrs. J. H. Bowman and H. P. Bock, London. The President's address and a full account of the proceedings will be published in the Annual Report of the Society.

## THE BUTTERFLIES OF INDIA.\*

Some three years or more ago, we noticed a work on the above subject by Marshall and de Nicéville, of which two volumes had been published, the last by de Nicéville alone. A third volume of over 500 compact pages has just come to hand, the most notable thing about which, at least to a dweller in temperate regions, is that it is wholly concerned with the *Lycaenidæ*, of which eighty-two genera and over four hundred species are described. Such wealth in these pigmies among butterflies is a striking fact. The author, however, beyond the generic collocation, has made no attempt to classify this immense assemblage, contenting himself with only distinguishing certain groups of genera by the name of one of the included genera, as the "*Thecla* group," etc., which groups are characterised in a general but not formal way in the body of the work. These agree tolerably well with the groups Doherty had previously characterised from the egg alone, but are about twice as numerous and are established mainly upon the structural features of the imago. This is better than Distant's artificial divisions, but there is plainly an open field here for investigation, and one which there is apparently no need for great delay in occupying, since (excepting the egg) the early stages of *Lycaeninae* appear to offer less service to the systematist than in any other group of butterflies.

What will surprise one in this volume, is the very considerable addition to our knowledge of the early stages of the *Lycaeninae*, for excepting the *Hesperidæ*, this group is in general the least known of butterflies. Yet something is recorded of no less than thirty-four genera, much of it new, and in many a good deal of interesting history is related. This is a great improvement on the preceding volumes. One particular case, that of the pomegranate butterfly, whose history was briefly and partially given by Westwood, seems valuable enough to reprint for the benefit of American readers; and another, *Curetis thetis*, may well be mentioned here:—"The twelfth segment [of the larva] bears two most extraordinary structures, which consist of two diverging, cylindrical, rigid pillars, arising from the subdorsal region and of a pale green colour. When the insect is touched or alarmed, from each pillar is everted a deep maroon tentacle as long as the rigid pillar, bearing at its end long

\*The Butterflies of India, Burmah and Ceylon. By Lionel de Nicéville, Calcutta. Vol. 3. 12 + 503 pp. 6 pl. 1890. 8°.

parti-coloured hairs, the basal third of each hair being black, the upper two-thirds white. The maroon tentacle with its long hairs spread out like a circular fan or rosette is whirled round with great rapidity in a plane parallel to the body, its use being almost certainly to frighten away its enemies, as this larva, as far as I am aware, is not attended by protecting ants and lacks the honey-gland on the eleventh segment present in so many lycænid larvæ which are affected by ants."

Ants have been found attendant upon half a dozen genera, and in many cases they have been identified by Dr. A. Forel, of Switzerland. At least a dozen species are concerned, and they are about equally divided between the Formicidæ and Myrmicidæ.

Spalgis, it appears, is another instance of a carnivorous lycænid comparable to our *Feniseca*, the larva associating with and feeding upon the "mealy bug" of the planters, a species of *Dactylopius*. De Nicéville in no way favors Edwards's belief that *Feniseca* belongs to the *Lemoniinae*, and adds nothing, as we had hoped he might be able to do, to Holland's suggestion that *Liphyra*, too, might be carnivorous, though he points out that the two genera differ in their perfect state in the number of subcostal nervules, and are therefore not so closely allied as Dr. Holland thought.

The seasonal dimorphism of many Indian *Lycænidæ* is well brought out, the dry and wet season taking the place of our spring and summer; indeed, it occurs in no less than eighteen genera, and this will be a revelation to many, and seems to bid fair to renovate the study of tropical butterflies. But while in India proper, "the seasonal forms seem to be chiefly restricted to two, a wet and a dry," in the Himalayan district of Sikkim "the dry season form which occurs at the end of the year differs somewhat from the dry season form which occurs in the spring, so that with regard to some species there may be said to be three forms—a spring, a wet season, and a winter form." Sexual dimorphism on the contrary is very rare among tropical *Lycænidæ*, de Nicéville stating that he does not know positively of any case, though he suspects it in a species of *Zephyrus*. On the authority of Doherty (a native of Cincinnati by the way, working most industriously in the east,) he credits half a dozen or more species as mimicking others of the same or neighboring groups of *Lycænidæ*. Much attention is also paid to the secondary sexual characteristics so far as their gross appearances are concerned, and they are noted in no less than nineteen genera.

Finally, we may call attention to the very interesting general chapter on the Lycænidæ at the beginning of the volume, which is of more than usual interest and rather exceptional in a work of this kind. The work itself must serve a very useful purpose ; its execution is remarkably even and shows great skill and balance on the part of the author. There are half a dozen plates like those of the former volumes and executed by the same parties, excepting that two of them are chromo-lithographs, but we could wish that some plates of the early stages might have been added, and the direct purposes of the book for the Indian student would have been served by others giving structural details.

SAMUEL H. SCUDDER.

## PARTIAL PREPARATORY STAGES OF ERYCIDES BATABANO, LEF.

BY HARRISON G. DYAR, RHINEBECK, N. Y.

EGG.—Nearly spherical, the base flattened a little. Around the sides are eighteen vertical ribs, every other one shorter, not reaching the summit. The natural color could not be ascertained.

\* \* \* \* \*

THIRD (?) LARVAL STAGE.—Head much larger than joint 2, flat before, broadly excavate at the summit, minutely granulated. Color wine red, blackish on the lower third, with a large round orange spot before the eyes on each side. Width of head 2.5 mm. The body tapers to each extremity. Its color is wine red, with a darker shade over the dorsum centrally, and seven transverse orange stripes on the upper half of the body on joints 5 to 11, anteriorly, the posterior ones interrupted dorsally. Venter a little whitish. Length of larva about 10 mm. It forms a place of concealment in the manner of *Endamus tityrus* or *E. proteus* by folding over a portion of the leaf and securing it by threads.

FOURTH LARVAL STAGE.—Head much as before but the black shade is less and the granulations more distinct. Width 3.8 mm. Body marked as before ; very minutely pilose and with small semi-obsolete circular

spots. Spiracles small and whitish. The cervical shield covers the upper half of joint 2, is smooth and wine red. Length of larva 20 mm. When disturbed, it ejects from its mouth a large quantity of dark red fluid.

**FIFTH LARVAL STAGE.**—Mature larva. Head pale brown, blackish around the mouth with a large round orange spot before the eyes. It is granulated and pilose, the hairs small, and appearing frosted on the upper part of the head. Width 6 mm. The body is much contracted, and much smaller at the extremities. Cervical shield pale brown, smooth, hidden when the insect is at rest. Joint 2 is pinkish below. The body is bright frosted white, thickly covered by little circular depressions, in the centre of each of which is a minute frosted hair. These hairs are longer on the anal plate, and the depression there less deep. Thoracic feet pale brown. Venter and abdominal feet white, without the marks of the dorsum. Length of larva 40 mm., greatest width of body 12 mm., greatest height 10 mm., width of joint 2 4.5 mm. Its place of concealment, at this stage, is formed of several leaves spun together and lined with silk. Immediately after the moult, the body is colored as in the previous stage, but the white color appears gradually in the course of several days.

The leaves the larva has spun together serve as its cocoon, and the pupa is held by several transverse threads around the body, with the cremaster fastened in others.

**PUPA.**—Robust; abdomen large, eyes prominent. Two short prominences on the head between the eyes. The leg and antennæ cases form a point extending below the wing cases. Cremaster excavate below, with ridges at the sides above, curved downward, blunt, and terminating in a number of brown hooks. The pupa has many small, rounded depressions, and is minutely pilose. Color creamy white, a greenish tint on the thorax and cases, and a yellow stripe on the upper part of the eye. Length 32 mm., diameter of the abdomen 10 mm., diameter of thorax 9 mm., width through the eyes 6 mm.

**FOOD PLANT.**—Mangrove, *Rhisophora mangle*; larvæ from Dade Co., Florida. I am not sure that the larval stage here first described is the *third*, but consider it most probable.

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Mailed October 6th.

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